Appendix N
Traffic Study

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IRVINE BUSINESS COMPLEX VISION PLAN
Traffic Study

Technical Appendices

Prepared for:

City of Irvine

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Appendix A Trip Generation by ITAM TAZ

Year 2015 Cumulative Baseline No Project Trip Generation (IBC TAZ)

ITAM	PRODUCTION					ATTRACTION					TOTAL	TOTAL	TOTAL
TAZ	HBW-P	WBO-P	HBO-P	OBO-P	SCH-P	HBW-A	WBO-A	HBO-A	OBO-A	SCH-A	PROD	ATTR	DAILY
395	0	704	0	222	0	872	380	125	198	0	926	1,575	2,501
396	0	1,183	0	434	0	1,457	645	278	397	0	1,617	2,777	4,395
397	0	608	0	395	0	709	432	481	362	0	1,003	1,984	2,986
398	0	491	0	280	0	582	323	307	257	0	771	1,469	2,239
399	0	769	0	274	0	948	419	172	250	0	1,043	1,788	2,832
400	0	1,191	0	392	0	1,472	645	231	352	0	1,583	2,699	4,282
401	0	680	0	250	0	837	371	161	229	0	931	1,598	2,529
402	0	446	0	169	0	548	244	111	155	0	615	1,059	1,674
403	0	898	0	2,382	0	648	1,587	4,077	2,219	0	3,280	8,532	11,812
404	0	613	0	243	0	753	337	164	225	0	856	1,478	2,335
405	0	740	0	282	0	910	405	185	259	0	1,022	1,759	2,781
406	0	239	0	73	0	297	129	40	65	0	312	530	843
407	0	254	0	84	0	314	138	49	75	0	338	577	915
408	0	693	0	295	0	847	386	215	275	0	988	1,722	2,710
409	0	877	0	368	0	1,074	484	258	343	0	1,245	2,158	3,404
410	0	303	0	99	0	374	164	57	88	0	401	684	1,085
411	403	782	640	406	77	976	494	321	381	0	2,310	2,172	4,482
412	0	334	0	121	0	412	182	77	110	0	455	781	1,236
413	0	693	0	250	0	854	378	159	228	0	944	1,619	2,562
414	0	1,185	0	499	0	1,448	669	379	460	0	1,684	2,956	4,640
415	0	267	0	105	0	328	146	71	97	0	372	642	1,014
416	0	468	0	205	0	569	274	174	188	0	674	1,205	1,879
417	0	412	0	192	0	502	229	142	181	0	604	1,054	1,657
418	0	625	0	248	0	768	343	167	229	0	873	1,507	2,380
419	0	116	0	33	0	144	62	17	29	0	149	252	401
420	0	789	0	287	0	971	430	182	261	0	1,075	1,845	2,920
421	0	557	0	228	0	683	307	157	211	0	785	1,358	2,143
422	2	405	3	159	0	495	235	129	143	0	570	1,003	1,573
423	0	448	0	213	0	545	250	159	202	0	661	1,156	1,817
424	0	472	0	175	0	581	258	113	160	0	647	1,112	1,759
425	0	837	0	399	0	1,019	467	298	377	0	1,236	2,161	3,397
426	0	977	0	455	0	1,189	550	348	427	0	1,431	2,514	3,945
427	0	252	0	101	0	310	139	69	94	0	354	611	965
428	0	470	0	184	0	576	265	136	168	0	654	1,144	1,799
429	0	714	0	277	0	878	391	185	255	0	991	1,709	2,700
430	0	1,492	0	658	0	1,823	826	473	617	0	2,150	3,739	5,890
431	0	698	0	260	0	858	388	182	236	0	959	1,664	2,623
432	0	270	0	115	0	330	149	81	107	0	385	667	1,052
433	0	342	0	113	0	422	185	67	101	0	455	775	1,230
434	0	528	0	205	0	648	289	137	189	0	733	1,263	1,995
435	0	166	0	58	0	205	90	35	52	0	224	383	606
436	0	597	0	261	0	729	330	186	244	0	857	1,490	2,347
437	0	412	0	187	0	502	231	140	175	0	598	1,048	1,646
438	0	816	0	305	0	1,004	446	198	280	0	1,121	1,928	3,049
439	0	1,267	0	482	0	1,557	693	317	442	0	1,748	3,009	4,757
440	0	344	0	103	0	427	185	55	91	0	447	758	1,205
441	0	748	0	552	0	860	552	691	511	0	1,300	2,614	3,914
442	0	206	0	69	0	254	111	41	62	0	274	469	743
443	0	263	0	293	0	281	240	417	274	0	555	1,212	1,768
444	0	142	0	59	0	174	78	41	55	0	201	348	549
445	0	341	0	122	0	420	186	76	111	0	463	793	1,255
446	0	634	0	223	0	782	345	138	202	0	857	1,468	2,325
447	0	284	0	129	0	344	171	119	117	0	413	751	1,164
448	0	397	0	294	0	459	284	351	275	0	692	1,369	2,061
449	0	491	0	171	0	605	267	106	155	0	662	1,133	1,794
450	0	254	0	81	0	315	137	46	72	0	335	570	905
451	0	262	0	124	0	319	146	92	117	0	386	675	1,061
452	0	772	0	402	0	932	451	343	379	0	1,174	2,105	3,279
453	0	747	0	356	0	910	417	266	336	0	1,103	1,928	3,031
454	0	360	0	172	0	438	201	128	162	0	532	930	1,462
455	0	358	0	135	0	440	196	88	124	0	493	848	1,341
456	0	1,629	0	1,299	0	1,845	1,283	1,740	1,196	0	2,928	6,064	8,992
457	0	442	0	167	0	544	242	110	154	0	610	1,049	1,658
458	0	318	0	136	0	390	176	96	127	0	454	787	1,242
459	0	1,239	0	618	0	1,501	712	504	582	0	1,857	3,299	5,156
460	0	331	0	117	0	408	180	73	106	0	448	767	1,215
461	0	393	0	128	0	485	212	75	115	0	521	888	1,409
462	0	786	0	266	0	970	426	160	240	0	1,052	1,796	2,848
463	0	169	0	68	0	207	93	46	63	0	237	409	645
464	374	394	594	261	72	500	261	195	253	0	1,695	1,209	2,904
465	0	274	0	97	0	337	149	60	88	0	370	634	1,004
466	0	152	0	134	0	170	121	176	125	0	286	591	877
467	0	592	0	282	0	720	330	211	267	0	874	1,528	2,402
468	0	460	0	155	0	569	250	93	139	0	615	1,051	1,666

Year 2015 Cumulative Baseline No Project Trip Generation (IBC TAZ)

ITAM	PRODUCTION					ATTRACTION					TOTAL	TOTAL	TOTAL
TAZ	HBW-P	WBO-P	HBO-P	OBO-P	SCH-P	HBW-A	WBO-A	HBO-A	OBO-A	SCH-A	PROD	ATTR	DAILY
469	0	419	0	196	0	510	233	145	185	0	615	1,074	1,688
470	0	729	0	842	0	773	692	1,230	785	0	1,571	3,479	5,050
471	0	1,046	0	470	0	1,274	590	359	439	0	1,515	2,661	4,177
472	0	137	0	49	0	169	75	30	44	0	186	318	504
473	0	445	0	170	0	548	244	112	157	0	616	1,060	1,676
474	0	953	0	342	0	1,174	519	215	311	0	1,294	2,219	3,514
475	0	110	0	276	0	83	185	469	257	0	386	994	1,380
476	0	285	0	107	0	350	156	70	98	0	392	675	1,067
477	0	576	0	233	0	707	317	159	216	0	809	1,398	2,207
478	0	1,612	0	768	0	1,961	899	574	727	0	2,380	4,161	6,540
479	0	227	0	88	0	279	124	59	82	0	315	543	859
480	0	1,175	0	730	0	1,391	749	745	687	0	1,904	3,572	5,476
481	0	644	0	203	0	798	348	115	181	0	847	1,441	2,288
482	0	914	0	412	0	1,115	507	299	387	0	1,326	2,308	3,634
483	0	450	0	154	0	556	244	93	139	0	604	1,033	1,637
484	0	2,760	0	2,656	0	3,053	2,291	3,573	2,487	0	5,416	11,403	16,820
485	149	220	237	110	29	279	137	73	104	0	745	592	1,337
486	1,124	0	1,785	285	216	52	131	234	296	0	3,410	713	4,123
487	0	1,439	0	937	0	1,710	866	856	904	0	2,376	4,336	6,712
488	0	3,597	0	1,710	0	4,377	2,005	1,276	1,617	0	5,306	9,276	14,582
489	0	155	0	102	0	181	109	122	94	0	258	506	764
490	0	1,582	0	1,010	0	1,875	984	982	962	0	2,592	4,804	7,396
491	0	844	0	434	0	1,019	490	365	409	0	1,278	2,284	3,561
492	0	291	0	91	0	361	157	51	81	0	382	650	1,032
493	0	682	0	453	0	801	451	488	426	0	1,135	2,166	3,301
494	0	752	0	650	0	868	493	666	635	0	1,402	2,662	4,064
495	0	893	0	535	0	1,053	600	604	493	0	1,429	2,750	4,179
496	0	800	0	347	0	978	442	247	325	0	1,148	1,993	3,141
497	609	293	967	544	117	326	384	731	521	0	2,531	1,962	4,492
498	0	2,534	0	2,084	0	2,884	1,899	2,586	1,957	0	4,618	9,325	13,943
499	0	791	0	449	0	940	509	471	416	0	1,240	2,337	3,577
500	0	1,248	0	595	0	1,518	696	445	563	0	1,843	3,221	5,064
501	0	657	0	745	0	730	475	822	734	0	1,402	2,761	4,163
502	0	191	0	91	0	233	107	68	86	0	282	493	775
503	0	1,182	0	577	0	1,435	668	450	545	0	1,760	3,099	4,858
504	0	2,388	0	1,141	0	2,905	1,333	857	1,080	0	3,529	6,174	9,704
505	0	691	0	781	0	767	499	862	769	0	1,471	2,897	4,369
506	0	273	0	282	0	298	236	388	264	0	555	1,187	1,742
507	0	261	0	125	0	318	146	93	118	0	386	674	1,060
508	0	0	0	0	0	0	0	0	0	0	0	0	0
509	0	2,346	0	1,173	0	2,842	1,338	941	1,108	0	3,518	6,230	9,748
510	0	3,180	0	1,615	0	3,847	1,828	1,324	1,526	0	4,795	8,525	13,320
511	0	509	0	526	0	567	385	623	509	0	1,035	2,084	3,120
512	0	319	0	152	0	389	178	114	144	0	472	825	1,296
513	0	264	0	125	0	322	147	94	119	0	390	681	1,071
514	0	186	0	358	0	166	253	584	334	0	544	1,336	1,881
515	0	0	0	0	0	0	0	0	0	0	0	0	0
516	240	3,155	380	2,615	46	3,612	2,370	3,192	2,462	0	6,436	11,634	18,070
517	0	155	0	48	0	191	83	26	42	0	202	343	546
518	0	309	0	148	0	377	173	110	140	0	457	799	1,256
519	0	384	0	435	0	426	277	480	428	0	818	1,612	2,430
520	0	208	0	99	0	253	116	74	94	0	307	536	843
521	0	830	0	376	0	1,013	461	274	353	0	1,206	2,101	3,307
522	0	302	0	222	0	350	212	257	209	0	524	1,028	1,553
523	248	4,685	394	2,296	48	5,713	2,641	1,721	2,178	0	7,671	12,253	19,924
524	0	1,151	0	549	0	1,400	642	410	519	0	1,699	2,971	4,670
525	0	1,593	0	695	0	1,946	881	496	650	0	2,287	3,974	6,262
526	548	194	871	256	105	256	186	231	255	0	1,975	928	2,903
527	0	0	0	0	0	0	0	0	0	0	0	0	0
528	0	308	0	101	0	381	167	59	91	0	409	697	1,106
529	0	369	0	141	0	453	202	93	130	0	510	879	1,389
530	0	255	0	121	0	310	142	91	115	0	376	657	1,033
531	0	383	0	183	0	466	214	137	173	0	566	990	1,556
532	1,733	0	2,401	410	333	81	202	347	427	0	4,878	1,056	5,934
533	0	125	0	59	0	152	69	44	56	0	184	321	505
534	0	1,333	0	708	0	1,605	784	614	668	0	2,040	3,671	5,712
535	0	0	0	0	0	0	0	0	0	0	0	0	0
536	0	144	0	61	0	176	79	43	57	0	205	355	560
537	0	271	0	302	0	290	247	428	283	0	572	1,248	1,820
538	0	1,023	0	614	0	1,216	642	610	578	0	1,637	3,047	4,684
539	0	207	0	92	0	253	115	67	87	0	299	521	820
540	1,296	0	2,058	329	249	60	151	270	341	0	3,932	823	4,755
541	0	208	0	99	0	253	116	74	94	0	307	537	845
542	0	348	0	459	0	357	357	688	430	0	807	1,831	2,638

Year 2015 Cumulative Baseline No Project Trip Generation (IBC TAZ)

ITAM	PRODUCTION					ATTRACTION					TOTAL	TOTAL	TOTAL
TAZ	HBW-P	WBO-P	HBO-P	OBO-P	SCH-P	HBW-A	WBO-A	HBO-A	OBO-A	SCH-A	PROD	ATTR	DAILY
543	0	366	0	239	0	431	243	259	224	0	605	1,156	1,762
544	3,801	41	6,034	1,077	730	206	518	987	1,105	0	11,683	2,816	14,499
545	0	420	0	308	0	484	306	379	287	0	728	1,455	2,183
546	0	4,044	0	2,489	0	4,794	2,569	2,524	2,345	0	6,534	12,232	18,766
TOTAL	**10,529**	**105,726**	**16,364**	**61,688**	**2,021**	**126,861**	**66,464**	**59,197**	**58,033**	**0**	**196,328**	**310,554**	**506,882**

Source: V:\11986-IBCVision\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineNoProj\Working Files\y13.Trips.Itam.091009.xls

Year 2015 Cumulative Baseline With Project Trip Generation (IBC TAZ)

ITAM	PRODUCTION					ATTRACTION					TOTAL	TOTAL	TOTAL
TAZ	HBW-P	WBO-P	HBO-P	OBO-P	SCH-P	HBW-A	WBO-A	HBO-A	OBO-A	SCH-A	PROD	ATTR	DAILY
395	0	704	0	222	0	872	380	125	198	0	926	1,575	2,501
396	0	1,183	0	434	0	1,457	645	278	397	0	1,617	2,777	4,395
397	0	608	0	395	0	709	432	481	362	0	1,003	1,984	2,986
398	0	491	0	280	0	582	323	307	257	0	771	1,469	2,239
399	0	769	0	274	0	948	419	172	250	0	1,043	1,788	2,832
400	0	1,191	0	392	0	1,472	645	231	352	0	1,583	2,699	4,282
401	0	680	0	250	0	837	371	161	229	0	931	1,598	2,529
402	0	446	0	169	0	548	244	111	155	0	615	1,059	1,674
403	0	898	0	2,382	0	648	1,587	4,077	2,219	0	3,280	8,532	11,812
404	0	613	0	243	0	753	337	164	225	0	856	1,478	2,335
405	0	740	0	282	0	910	405	185	259	0	1,022	1,759	2,781
406	0	239	0	73	0	297	129	40	65	0	312	530	843
407	0	254	0	84	0	314	138	49	75	0	338	577	915
408	0	693	0	295	0	847	386	215	275	0	988	1,722	2,710
409	0	877	0	368	0	1,074	484	258	343	0	1,245	2,158	3,404
410	0	303	0	99	0	374	164	57	88	0	401	684	1,085
411	403	782	514	396	77	976	494	315	371	0	2,173	2,156	4,329
412	0	334	0	121	0	412	182	77	110	0	455	781	1,236
413	0	693	0	250	0	854	378	159	228	0	944	1,619	2,562
414	0	1,303	0	651	0	1,567	797	621	601	0	1,954	3,585	5,539
415	0	267	0	105	0	328	146	71	97	0	372	642	1,014
416	0	468	0	205	0	569	274	174	188	0	674	1,205	1,879
417	0	412	0	192	0	502	229	142	181	0	604	1,054	1,657
418	0	625	0	248	0	768	343	167	229	0	873	1,507	2,380
419	0	116	0	33	0	144	62	17	29	0	149	252	401
420	0	789	0	287	0	971	430	182	261	0	1,075	1,845	2,920
421	0	557	0	228	0	683	307	157	211	0	785	1,358	2,143
422	2	405	3	159	0	495	235	129	143	0	570	1,002	1,572
423	0	448	0	213	0	545	250	159	202	0	661	1,156	1,817
424	0	472	0	175	0	581	258	113	160	0	647	1,112	1,759
425	0	837	0	399	0	1,019	467	298	377	0	1,236	2,161	3,397
426	0	977	0	455	0	1,189	550	348	427	0	1,431	2,514	3,945
427	0	252	0	101	0	310	139	69	94	0	354	611	965
428	0	470	0	184	0	576	265	136	168	0	654	1,144	1,799
429	0	714	0	277	0	878	391	185	255	0	991	1,709	2,700
430	0	1,492	0	658	0	1,823	826	473	617	0	2,150	3,739	5,890
431	0	698	0	260	0	858	388	182	236	0	959	1,664	2,623
432	0	270	0	115	0	330	149	81	107	0	385	667	1,052
433	0	342	0	113	0	422	185	67	101	0	455	775	1,230
434	0	528	0	205	0	648	289	137	189	0	733	1,263	1,995
435	0	166	0	58	0	205	90	35	52	0	224	383	606
436	0	597	0	261	0	729	330	186	244	0	857	1,490	2,347
437	0	507	0	232	0	618	284	174	218	0	740	1,295	2,034
438	0	816	0	305	0	1,004	446	198	280	0	1,121	1,928	3,049
439	0	1,267	0	482	0	1,557	693	317	442	0	1,748	3,009	4,757
440	0	423	0	140	0	522	229	83	126	0	563	961	1,524
441	0	748	0	552	0	860	552	691	511	0	1,300	2,614	3,914
442	0	206	0	69	0	254	111	41	62	0	274	469	743
443	0	263	0	293	0	281	240	417	274	0	555	1,212	1,768
444	0	142	0	59	0	174	78	41	55	0	201	348	549
445	494	174	784	183	95	238	152	138	182	0	1,730	710	2,440
446	1,292	460	2,051	488	248	627	401	368	485	0	4,539	1,881	6,421
447	0	284	0	129	0	344	171	119	117	0	413	751	1,164
448	0	397	0	294	0	459	284	351	275	0	692	1,369	2,061
449	0	491	0	171	0	605	267	106	155	0	662	1,133	1,794
450	0	254	0	81	0	315	137	46	72	0	335	570	905
451	0	262	0	124	0	319	146	92	117	0	386	675	1,061
452	0	772	0	402	0	932	451	343	379	0	1,174	2,105	3,279
453	0	747	0	356	0	910	417	266	336	0	1,103	1,928	3,031
454	0	360	0	172	0	438	201	128	162	0	532	930	1,462
455	492	191	468	170	94	258	162	136	169	0	1,415	725	2,140
456	0	1,911	0	1,434	0	2,189	1,440	1,840	1,324	0	3,345	6,793	10,138
457	0	442	0	167	0	544	242	110	154	0	610	1,049	1,658
458	0	318	0	136	0	390	176	96	127	0	454	787	1,242
459	0	1,239	0	618	0	1,501	712	504	582	0	1,857	3,299	5,156
460	0	331	0	117	0	408	180	73	106	0	448	767	1,215
461	0	393	0	128	0	485	212	75	115	0	521	888	1,409
462	0	1,457	0	586	0	1,787	800	399	543	0	2,043	3,529	5,571
463	0	169	0	68	0	207	93	46	63	0	237	409	645
464	733	250	1,164	305	141	339	225	241	305	0	2,593	1,110	3,704
465	0	327	0	219	0	379	236	273	200	0	546	1,089	1,635
466	0	152	0	134	0	170	121	176	125	0	286	591	877
467	0	592	0	282	0	720	330	211	267	0	874	1,528	2,402
468	0	496	0	180	0	611	270	115	165	0	676	1,160	1,837

Year 2015 Cumulative Baseline With Project Trip Generation (IBC TAZ)

ITAM	PRODUCTION					ATTRACTION					TOTAL	TOTAL	TOTAL
TAZ	HBW-P	WBO-P	HBO-P	OBO-P	SCH-P	HBW-A	WBO-A	HBO-A	OBO-A	SCH-A	PROD	ATTR	DAILY
469	0	419	0	196	0	510	233	145	185	0	615	1,074	1,688
470	0	729	0	842	0	773	692	1,230	785	0	1,571	3,479	5,050
471	0	997	0	455	0	1,214	564	351	425	0	1,452	2,553	4,005
472	0	137	0	49	0	169	75	30	44	0	186	318	504
473	0	344	0	122	0	424	187	76	111	0	465	797	1,262
474	0	953	0	342	0	1,174	519	215	311	0	1,294	2,219	3,514
475	0	110	0	276	0	83	185	469	257	0	386	994	1,380
476	0	285	0	107	0	350	156	70	98	0	392	675	1,067
477	0	576	0	233	0	707	317	159	216	0	809	1,398	2,207
478	0	1,617	0	771	0	1,968	902	576	729	0	2,388	4,175	6,563
479	0	227	0	88	0	279	124	59	82	0	315	543	859
480	0	1,175	0	730	0	1,391	749	745	687	0	1,904	3,572	5,476
481	0	644	0	203	0	798	348	115	181	0	847	1,441	2,288
482	0	914	0	412	0	1,115	507	299	387	0	1,326	2,308	3,634
483	0	450	0	154	0	556	244	93	139	0	604	1,033	1,637
484	0	2,760	0	2,656	0	3,053	2,291	3,573	2,487	0	5,416	11,403	16,820
485	670	220	1,064	242	129	304	197	182	241	0	2,325	923	3,248
486	1,137	0	1,482	261	218	53	133	223	272	0	3,098	681	3,779
487	0	1,439	0	937	0	1,710	866	856	904	0	2,376	4,336	6,712
488	0	3,597	0	1,710	0	4,377	2,005	1,276	1,617	0	5,306	9,276	14,582
489	0	155	0	102	0	181	109	122	94	0	258	506	764
490	1,011	1,582	1,604	1,266	194	1,922	1,102	1,193	1,228	0	5,657	5,446	11,103
491	0	995	0	630	0	1,173	654	677	590	0	1,625	3,093	4,719
492	408	225	388	145	78	299	168	106	141	0	1,244	714	1,958
493	0	682	0	453	0	801	451	488	426	0	1,135	2,166	3,301
494	0	752	0	650	0	868	493	666	635	0	1,402	2,662	4,064
495	0	893	0	535	0	1,053	600	604	493	0	1,429	2,750	4,179
496	0	800	0	347	0	978	442	247	325	0	1,148	1,993	3,141
497	609	293	967	544	117	326	384	731	521	0	2,531	1,962	4,492
498	0	2,534	0	2,084	0	2,884	1,899	2,586	1,957	0	4,618	9,325	13,943
499	0	791	0	449	0	940	509	471	416	0	1,240	2,337	3,577
500	0	1,248	0	595	0	1,518	696	445	563	0	1,843	3,221	5,064
501	0	657	0	745	0	730	475	822	734	0	1,402	2,761	4,163
502	0	191	0	91	0	233	107	68	86	0	282	493	775
503	0	1,182	0	577	0	1,435	668	450	545	0	1,760	3,099	4,858
504	0	2,388	0	1,141	0	2,905	1,333	857	1,080	0	3,529	6,174	9,704
505	0	691	0	781	0	767	499	862	769	0	1,471	2,897	4,369
506	0	273	0	282	0	298	236	388	264	0	555	1,187	1,742
507	0	261	0	125	0	318	146	93	118	0	386	674	1,060
508	1,738	0	2,759	441	334	81	203	362	457	0	5,270	1,103	6,373
509	0	2,346	0	1,173	0	2,842	1,338	941	1,108	0	3,518	6,230	9,748
510	0	3,180	0	1,615	0	3,847	1,828	1,324	1,526	0	4,795	8,525	13,320
511	0	509	0	526	0	567	385	623	509	0	1,035	2,084	3,120
512	0	319	0	152	0	389	178	114	144	0	472	825	1,296
513	0	264	0	125	0	322	147	94	119	0	390	681	1,071
514	0	186	0	358	0	166	253	584	334	0	544	1,336	1,881
515	1,162	322	1,845	611	223	410	405	669	602	0	4,163	2,086	6,249
516	487	3,337	774	3,177	94	3,751	2,729	4,100	2,992	0	7,869	13,573	21,442
517	0	155	0	48	0	191	83	26	42	0	202	343	546
518	0	1,005	0	479	0	1,224	561	358	453	0	1,485	2,596	4,080
519	0	384	0	435	0	426	277	480	428	0	818	1,612	2,430
520	0	208	0	99	0	253	116	74	94	0	307	536	843
521	0	830	0	376	0	1,013	461	274	353	0	1,206	2,101	3,307
522	0	166	0	157	0	184	136	209	147	0	323	675	998
523	2,101	4,777	3,336	3,016	403	5,864	3,023	2,536	2,898	0	13,633	14,321	27,954
524	0	1,151	0	549	0	1,400	642	410	519	0	1,699	2,971	4,670
525	0	1,632	0	714	0	1,995	903	511	668	0	2,346	4,077	6,423
526	964	194	1,336	346	185	276	235	310	348	0	3,025	1,168	4,193
527	328	0	454	78	63	15	38	66	81	0	922	200	1,122
528	0	1,406	0	734	0	1,697	820	624	693	0	2,141	3,834	5,974
529	0	455	0	183	0	558	250	124	169	0	638	1,101	1,739
530	0	255	0	121	0	310	142	91	115	0	376	657	1,033
531	0	383	0	183	0	466	214	137	173	0	566	990	1,556
532	1,733	0	2,752	440	333	81	202	361	456	0	5,258	1,100	6,358
533	0	125	0	59	0	152	69	44	56	0	184	321	505
534	0	1,333	0	708	0	1,605	784	614	668	0	2,040	3,671	5,712
535	0	1,807	0	1,354	0	2,100	1,216	1,471	1,291	0	3,161	6,078	9,239
536	0	144	0	61	0	176	79	43	57	0	205	355	560
537	0	271	0	302	0	290	247	428	283	0	572	1,248	1,820
538	0	1,023	0	614	0	1,216	642	610	578	0	1,637	3,047	4,684
539	0	207	0	92	0	253	115	67	87	0	299	521	820
540	1,296	0	2,058	329	249	60	151	270	341	0	3,932	823	4,755
541	0	208	0	99	0	253	116	74	94	0	307	537	845
542	0	348	0	459	0	357	357	688	430	0	807	1,831	2,638

Year 2015 Cumulative Baseline With Project Trip Generation (IBC TAZ)

ITAM	PRODUCTION					ATTRACTION					TOTAL	TOTAL	TOTAL
TAZ	HBW-P	WBO-P	HBO-P	OBO-P	SCH-P	HBW-A	WBO-A	HBO-A	OBO-A	SCH-A	PROD	ATTR	DAILY
543	1,252	29	1,988	396	240	79	198	396	403	0	3,906	1,076	4,982
544	3,801	41	6,034	1,077	730	206	518	987	1,105	0	11,683	2,816	14,499
545	849	318	1,348	530	163	388	375	619	516	0	3,208	1,898	5,106
546	0	4,044	0	2,489	0	4,794	2,569	2,524	2,345	0	6,534	12,232	18,766
TOTAL	**22,963**	**110,097**	**35,172**	**68,697**	**4,408**	**132,363**	**71,267**	**66,658**	**64,945**	**0**	**241,338**	**335,234**	**576,572**

Source: V:\11986-IBCVision\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineWProj\Working Files\y13.Trips.Itam.091009.xls

Post-2030 Cumulative Baseline No Project Trip Generation (IBC TAZ)

ITAM	PRODUCTION					ATTRACTION					TOTAL	TOTAL	TOTAL
TAZ	HBW-P	WBO-P	HBO-P	OBO-P	SCH-P	HBW-A	WBO-A	HBO-A	OBO-A	SCH-A	PROD	ATTR	DAILY
395	0	704	0	222	0	872	380	125	198	0	926	1,575	2,501
396	0	1,183	0	434	0	1,457	645	278	397	0	1,617	2,777	4,395
397	0	608	0	395	0	709	432	481	362	0	1,003	1,984	2,986
398	0	491	0	280	0	582	323	307	257	0	771	1,469	2,239
399	0	769	0	274	0	948	419	172	250	0	1,043	1,788	2,832
400	0	1,191	0	392	0	1,472	645	231	352	0	1,583	2,699	4,282
401	0	680	0	250	0	837	371	161	229	0	931	1,598	2,529
402	0	446	0	169	0	548	244	111	155	0	615	1,059	1,674
403	0	898	0	2,382	0	648	1,587	4,077	2,219	0	3,280	8,532	11,812
404	0	613	0	243	0	753	337	164	225	0	856	1,478	2,335
405	0	740	0	282	0	910	405	185	259	0	1,022	1,759	2,781
406	0	239	0	73	0	297	129	40	65	0	312	530	843
407	0	254	0	84	0	314	138	49	75	0	338	577	915
408	0	693	0	295	0	847	386	215	275	0	988	1,722	2,710
409	0	877	0	368	0	1,074	484	258	343	0	1,245	2,158	3,404
410	0	303	0	99	0	374	164	57	88	0	401	684	1,085
411	403	782	640	406	77	976	494	321	381	0	2,310	2,172	4,482
412	0	334	0	121	0	412	182	77	110	0	455	781	1,236
413	0	693	0	250	0	854	378	159	228	0	944	1,619	2,562
414	0	1,185	0	499	0	1,448	669	379	460	0	1,684	2,956	4,640
415	0	267	0	105	0	328	146	71	97	0	372	642	1,014
416	0	468	0	205	0	569	274	174	188	0	674	1,205	1,879
417	0	412	0	192	0	502	229	142	181	0	604	1,054	1,657
418	0	625	0	248	0	768	343	167	229	0	873	1,507	2,380
419	0	116	0	33	0	144	62	17	29	0	149	252	401
420	0	789	0	287	0	971	430	182	261	0	1,075	1,845	2,920
421	0	557	0	228	0	683	307	157	211	0	785	1,358	2,143
422	2	405	3	159	0	495	235	129	143	0	570	1,003	1,573
423	0	448	0	213	0	545	250	159	202	0	661	1,156	1,817
424	0	472	0	175	0	581	258	113	160	0	647	1,112	1,759
425	0	837	0	399	0	1,019	467	298	377	0	1,236	2,161	3,397
426	0	977	0	455	0	1,189	550	348	427	0	1,431	2,514	3,945
427	0	252	0	101	0	310	139	69	94	0	354	611	965
428	0	470	0	184	0	576	265	136	168	0	654	1,144	1,799
429	0	714	0	277	0	878	391	185	255	0	991	1,709	2,700
430	0	1,492	0	658	0	1,823	826	473	617	0	2,150	3,739	5,890
431	0	698	0	260	0	858	388	182	236	0	959	1,664	2,623
432	0	270	0	115	0	330	149	81	107	0	385	667	1,052
433	0	342	0	113	0	422	185	67	101	0	455	775	1,230
434	0	528	0	205	0	648	289	137	189	0	733	1,263	1,995
435	0	166	0	58	0	205	90	35	52	0	224	383	606
436	0	597	0	261	0	729	330	186	244	0	857	1,490	2,347
437	0	412	0	187	0	502	231	140	175	0	598	1,048	1,646
438	0	816	0	305	0	1,004	446	198	280	0	1,121	1,928	3,049
439	0	1,267	0	482	0	1,557	693	317	442	0	1,748	3,009	4,757
440	0	344	0	103	0	427	185	55	91	0	447	758	1,205
441	0	748	0	552	0	860	552	691	511	0	1,300	2,614	3,914
442	0	206	0	69	0	254	111	41	62	0	274	469	743
443	0	263	0	293	0	281	240	417	274	0	555	1,212	1,768
444	0	142	0	59	0	174	78	41	55	0	201	348	549
445	0	341	0	122	0	420	186	76	111	0	463	793	1,255
446	0	634	0	223	0	782	345	138	202	0	857	1,468	2,325
447	0	284	0	129	0	344	171	119	117	0	413	751	1,164
448	0	397	0	294	0	459	284	351	275	0	692	1,369	2,061
449	0	491	0	171	0	605	267	106	155	0	662	1,133	1,794
450	0	254	0	81	0	315	137	46	72	0	335	570	905
451	0	262	0	124	0	319	146	92	117	0	386	675	1,061
452	0	772	0	402	0	932	451	343	379	0	1,174	2,105	3,279
453	0	747	0	356	0	910	417	266	336	0	1,103	1,928	3,031
454	0	360	0	172	0	438	201	128	162	0	532	930	1,462
455	0	358	0	135	0	440	196	88	124	0	493	848	1,341
456	0	1,629	0	1,299	0	1,845	1,283	1,740	1,196	0	2,928	6,064	8,992
457	0	442	0	167	0	544	242	110	154	0	610	1,049	1,658
458	0	318	0	136	0	390	176	96	127	0	454	787	1,242
459	0	1,239	0	618	0	1,501	712	504	582	0	1,857	3,299	5,156
460	0	331	0	117	0	408	180	73	106	0	448	767	1,215
461	0	393	0	128	0	485	212	75	115	0	521	888	1,409
462	0	786	0	266	0	970	426	160	240	0	1,052	1,796	2,848
463	0	169	0	68	0	207	93	46	63	0	237	409	645
464	374	394	594	261	72	500	261	195	253	0	1,695	1,209	2,904
465	0	274	0	97	0	337	149	60	88	0	370	634	1,004
466	0	152	0	134	0	170	121	176	125	0	286	591	877
467	0	592	0	282	0	720	330	211	267	0	874	1,528	2,402
468	0	460	0	155	0	569	250	93	139	0	615	1,051	1,666

Post-2030 Cumulative Baseline No Project Trip Generation (IBC TAZ)

ITAM	PRODUCTION					ATTRACTION					TOTAL	TOTAL	TOTAL
TAZ	HBW-P	WBO-P	HBO-P	OBO-P	SCH-P	HBW-A	WBO-A	HBO-A	OBO-A	SCH-A	PROD	ATTR	DAILY
469	0	419	0	196	0	510	233	145	185	0	615	1,074	1,688
470	0	729	0	842	0	773	692	1,230	785	0	1,571	3,479	5,050
471	0	1,046	0	470	0	1,274	590	359	439	0	1,515	2,661	4,177
472	0	137	0	49	0	169	75	30	44	0	186	318	504
473	0	445	0	170	0	548	244	112	157	0	616	1,060	1,676
474	0	953	0	342	0	1,174	519	215	311	0	1,294	2,219	3,514
475	0	110	0	276	0	83	185	469	257	0	386	994	1,380
476	0	285	0	107	0	350	156	70	98	0	392	675	1,067
477	0	576	0	233	0	707	317	159	216	0	809	1,398	2,207
478	0	1,612	0	768	0	1,961	899	574	727	0	2,380	4,161	6,540
479	0	227	0	88	0	279	124	59	82	0	315	543	859
480	0	1,175	0	730	0	1,391	749	745	687	0	1,904	3,572	5,476
481	0	644	0	203	0	798	348	115	181	0	847	1,441	2,288
482	0	914	0	412	0	1,115	507	299	387	0	1,326	2,308	3,634
483	0	450	0	154	0	556	244	93	139	0	604	1,033	1,637
484	0	2,760	0	2,656	0	3,053	2,291	3,573	2,487	0	5,416	11,403	16,820
485	149	220	237	110	29	279	137	73	104	0	745	592	1,337
486	1,124	0	1,785	285	216	52	131	234	296	0	3,410	713	4,123
487	0	1,439	0	937	0	1,710	866	856	904	0	2,376	4,336	6,712
488	0	3,597	0	1,710	0	4,377	2,005	1,276	1,617	0	5,306	9,276	14,582
489	0	155	0	102	0	181	109	122	94	0	258	506	764
490	0	1,582	0	1,010	0	1,875	984	982	962	0	2,592	4,804	7,396
491	0	844	0	434	0	1,019	490	365	409	0	1,278	2,284	3,561
492	0	291	0	91	0	361	157	51	81	0	382	650	1,032
493	0	682	0	453	0	801	451	488	426	0	1,135	2,166	3,301
494	0	752	0	650	0	868	493	666	635	0	1,402	2,662	4,064
495	0	893	0	535	0	1,053	600	604	493	0	1,429	2,750	4,179
496	0	800	0	347	0	978	442	247	325	0	1,148	1,993	3,141
497	609	293	967	544	117	326	384	731	521	0	2,531	1,962	4,492
498	0	2,534	0	2,084	0	2,884	1,899	2,586	1,957	0	4,618	9,325	13,943
499	0	791	0	449	0	940	509	471	416	0	1,240	2,337	3,577
500	0	1,248	0	595	0	1,518	696	445	563	0	1,843	3,221	5,064
501	0	657	0	745	0	730	475	822	734	0	1,402	2,761	4,163
502	0	191	0	91	0	233	107	68	86	0	282	493	775
503	0	1,182	0	577	0	1,435	668	450	545	0	1,760	3,099	4,858
504	0	2,388	0	1,141	0	2,905	1,333	857	1,080	0	3,529	6,174	9,704
505	0	691	0	781	0	767	499	862	769	0	1,471	2,897	4,369
506	0	273	0	282	0	298	236	388	264	0	555	1,187	1,742
507	0	261	0	125	0	318	146	93	118	0	386	674	1,060
508	0	0	0	0	0	0	0	0	0	0	0	0	0
509	0	2,346	0	1,173	0	2,842	1,338	941	1,108	0	3,518	6,230	9,748
510	0	3,180	0	1,615	0	3,847	1,828	1,324	1,526	0	4,795	8,525	13,320
511	0	509	0	526	0	567	385	623	509	0	1,035	2,084	3,120
512	0	319	0	152	0	389	178	114	144	0	472	825	1,296
513	0	264	0	125	0	322	147	94	119	0	390	681	1,071
514	0	186	0	358	0	166	253	584	334	0	544	1,336	1,881
515	0	0	0	0	0	0	0	0	0	0	0	0	0
516	240	3,155	380	2,615	46	3,612	2,370	3,192	2,462	0	6,436	11,634	18,070
517	0	155	0	48	0	191	83	26	42	0	202	343	546
518	0	309	0	148	0	377	173	110	140	0	457	799	1,256
519	0	384	0	435	0	426	277	480	428	0	818	1,612	2,430
520	0	208	0	99	0	253	116	74	94	0	307	536	843
521	0	830	0	376	0	1,013	461	274	353	0	1,206	2,101	3,307
522	0	302	0	222	0	350	212	257	209	0	524	1,028	1,553
523	248	4,685	394	2,296	48	5,713	2,641	1,721	2,178	0	7,671	12,253	19,924
524	0	1,151	0	549	0	1,400	642	410	519	0	1,699	2,971	4,670
525	0	1,593	0	695	0	1,946	881	496	650	0	2,287	3,974	6,262
526	548	194	871	256	105	256	186	231	255	0	1,975	928	2,903
527	0	0	0	0	0	0	0	0	0	0	0	0	0
528	0	308	0	101	0	381	167	59	91	0	409	697	1,106
529	0	369	0	141	0	453	202	93	130	0	510	879	1,389
530	0	255	0	121	0	310	142	91	115	0	376	657	1,033
531	0	383	0	183	0	466	214	137	173	0	566	990	1,556
532	1,733	0	2,401	410	333	81	202	347	427	0	4,878	1,056	5,934
533	0	125	0	59	0	152	69	44	56	0	184	321	505
534	0	1,333	0	708	0	1,605	784	614	668	0	2,040	3,671	5,712
535	0	0	0	0	0	0	0	0	0	0	0	0	0
536	0	144	0	61	0	176	79	43	57	0	205	355	560
537	0	271	0	302	0	290	247	428	283	0	572	1,248	1,820
538	0	1,023	0	614	0	1,216	642	610	578	0	1,637	3,047	4,684
539	0	207	0	92	0	253	115	67	87	0	299	521	820
540	1,296	0	2,058	329	249	60	151	270	341	0	3,932	823	4,755
541	0	208	0	99	0	253	116	74	94	0	307	537	845
542	0	348	0	459	0	357	357	688	430	0	807	1,831	2,638

Post-2030 Cumulative Baseline No Project Trip Generation (IBC TAZ)

ITAM	PRODUCTION					ATTRACTION					TOTAL	TOTAL	TOTAL
TAZ	HBW-P	WBO-P	HBO-P	OBO-P	SCH-P	HBW-A	WBO-A	HBO-A	OBO-A	SCH-A	PROD	ATTR	DAILY
543	0	366	0	239	0	431	243	259	224	0	605	1,156	1,762
544	3,801	41	6,034	1,077	730	206	518	987	1,105	0	11,683	2,816	14,499
545	0	420	0	308	0	484	306	379	287	0	728	1,455	2,183
546	0	4,044	0	2,489	0	4,794	2,569	2,524	2,345	0	6,534	12,232	18,766
TOTAL	**10,529**	**105,726**	**16,364**	**61,688**	**2,021**	**126,861**	**66,464**	**59,197**	**58,033**	**0**	**196,328**	**310,554**	**506,882**

Source: V:\11986-IBCVision\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\noProj\Working Files\p30.Trips.Itam.100109.xls

Post-2030 Cumulative Baseline With Project Trip Generation (IBC TAZ)

ITAM	PRODUCTION					ATTRACTION					TOTAL	TOTAL	TOTAL
TAZ	HBW-P	WBO-P	HBO-P	OBO-P	SCH-P	HBW-A	WBO-A	HBO-A	OBO-A	SCH-A	PROD	ATTR	DAILY
395	0	1,162	0	440	0	1,429	636	289	404	0	1,603	2,758	4,360
396	0	1,377	0	526	0	1,693	753	347	484	0	1,903	3,277	5,181
397	0	780	0	476	0	917	527	542	439	0	1,256	2,426	3,682
398	0	546	0	306	0	649	354	326	282	0	852	1,611	2,464
399	0	1,187	0	474	0	1,456	651	321	438	0	1,660	2,867	4,527
400	0	1,398	0	491	0	1,724	760	304	445	0	1,889	3,234	5,122
401	0	878	0	345	0	1,079	482	232	318	0	1,223	2,110	3,334
402	0	536	0	212	0	658	294	143	196	0	748	1,290	2,038
403	0	1,152	0	2,503	0	957	1,728	4,168	2,334	0	3,655	9,188	12,843
404	0	1,344	0	591	0	1,642	744	424	553	0	1,934	3,363	5,297
405	0	912	0	363	0	1,119	501	246	336	0	1,275	2,202	3,477
406	0	399	0	149	0	491	218	97	137	0	549	944	1,492
407	0	333	0	121	0	410	182	78	111	0	454	780	1,234
408	0	789	0	341	0	964	439	249	318	0	1,130	1,970	3,100
409	0	983	0	419	0	1,203	543	296	391	0	1,403	2,433	3,835
410	298	325	284	183	57	413	212	136	176	0	1,147	937	2,085
411	403	1,549	640	767	77	1,910	921	588	721	0	3,437	4,140	7,577
412	0	406	0	155	0	499	222	102	143	0	561	966	1,527
413	0	1,054	0	422	0	1,293	579	287	391	0	1,476	2,550	4,026
414	0	1,435	0	714	0	1,727	870	668	660	0	2,149	3,926	6,075
415	0	317	0	129	0	389	174	88	119	0	446	771	1,217
416	0	673	0	287	0	821	386	230	264	0	961	1,701	2,661
417	298	288	284	197	57	365	196	157	193	0	1,125	910	2,036
418	0	693	0	280	0	850	381	191	259	0	973	1,681	2,654
419	0	133	0	41	0	164	72	23	37	0	174	295	469
420	355	757	564	375	68	948	455	260	354	0	2,119	2,017	4,137
421	708	384	674	315	136	501	296	255	312	0	2,217	1,364	3,580
422	2	1,172	3	506	0	1,430	660	382	470	0	1,684	2,943	4,627
423	0	726	0	346	0	883	405	259	327	0	1,072	1,874	2,946
424	0	530	0	202	0	651	290	133	186	0	731	1,259	1,991
425	765	548	728	415	147	703	395	334	408	0	2,602	1,840	4,442
426	0	1,029	0	480	0	1,252	579	366	451	0	1,508	2,648	4,157
427	0	312	0	130	0	383	172	90	121	0	442	766	1,208
428	0	582	0	237	0	712	327	176	218	0	820	1,434	2,253
429	567	632	540	362	109	802	413	270	349	0	2,210	1,833	4,043
430	0	1,541	0	681	0	1,882	853	491	639	0	2,222	3,864	6,086
431	624	575	991	387	120	733	395	298	373	0	2,696	1,800	4,496
432	0	323	0	140	0	395	178	100	131	0	463	804	1,266
433	284	209	270	131	54	271	147	98	127	0	949	644	1,592
434	0	630	0	254	0	773	346	173	235	0	884	1,528	2,412
435	0	227	0	87	0	279	124	57	80	0	314	540	854
436	0	660	0	291	0	806	365	209	272	0	951	1,653	2,604
437	0	546	0	251	0	666	306	188	236	0	797	1,395	2,192
438	427	726	406	365	82	913	447	263	347	0	2,006	1,970	3,977
439	0	1,467	0	577	0	1,802	805	388	533	0	2,045	3,527	5,572
440	511	128	486	145	98	182	129	118	145	0	1,367	574	1,942
441	0	795	0	575	0	917	578	708	533	0	1,369	2,736	4,105
442	427	131	406	134	82	181	121	109	134	0	1,179	545	1,725
443	0	271	0	297	0	291	245	420	278	0	568	1,234	1,802
444	0	161	0	68	0	197	89	48	64	0	229	398	627
445	494	162	784	193	95	221	147	150	193	0	1,727	711	2,438
446	1,292	407	2,051	562	248	542	419	527	556	0	4,561	2,043	6,604
447	0	318	0	146	0	384	190	132	133	0	463	839	1,303
448	0	397	0	294	0	459	284	351	275	0	692	1,369	2,061
449	0	583	0	218	0	717	318	141	200	0	801	1,377	2,178
450	0	277	0	92	0	342	150	54	82	0	369	629	998
451	0	262	0	124	0	319	146	92	117	0	386	675	1,061
452	0	772	0	402	0	932	451	343	379	0	1,174	2,105	3,279
453	0	749	0	356	0	912	418	266	337	0	1,106	1,933	3,039
454	0	360	0	172	0	438	201	128	162	0	532	930	1,462
455	492	241	468	195	94	318	190	155	193	0	1,490	856	2,346
456	0	2,213	0	1,579	0	2,556	1,608	1,949	1,461	0	3,792	7,575	11,367
457	0	566	0	226	0	694	311	153	209	0	792	1,367	2,159
458	0	498	0	221	0	608	276	160	207	0	719	1,251	1,970
459	0	1,268	0	631	0	1,535	728	514	595	0	1,899	3,372	5,270
460	0	676	0	282	0	828	373	196	262	0	958	1,660	2,618
461	0	530	0	196	0	652	289	126	179	0	726	1,247	1,973
462	0	1,445	0	585	0	1,772	794	400	542	0	2,030	3,508	5,538
463	0	226	0	89	0	277	124	60	82	0	315	543	857
464	733	250	1,164	305	141	339	225	241	305	0	2,593	1,110	3,704
465	0	403	0	255	0	472	279	300	235	0	658	1,285	1,942
466	0	152	0	134	0	170	121	176	125	0	286	591	877
467	0	592	0	282	0	720	330	211	267	0	874	1,528	2,402
468	0	479	0	262	0	570	307	276	242	0	741	1,395	2,136

Post-2030 Cumulative Baseline With Project Trip Generation (IBC TAZ)

ITAM	PRODUCTION					ATTRACTION					TOTAL	TOTAL	TOTAL
TAZ	HBW-P	WBO-P	HBO-P	OBO-P	SCH-P	HBW-A	WBO-A	HBO-A	OBO-A	SCH-A	PROD	ATTR	DAILY
469	0	434	0	204	0	529	242	151	192	0	638	1,114	1,751
470	0	750	0	852	0	798	704	1,237	795	0	1,602	3,534	5,136
471	0	1,348	0	590	0	1,645	755	440	550	0	1,938	3,390	5,328
472	0	168	0	64	0	207	92	42	59	0	232	400	632
473	0	550	0	221	0	674	302	151	205	0	771	1,332	2,103
474	1,248	547	1,981	533	240	730	446	406	528	0	4,549	2,110	6,659
475	0	133	0	287	0	111	198	477	268	0	421	1,055	1,476
476	0	243	0	177	0	280	179	222	164	0	420	844	1,264
477	0	616	0	253	0	755	339	175	235	0	869	1,503	2,372
478	0	1,474	0	826	0	1,765	890	763	779	0	2,300	4,198	6,498
479	0	228	0	89	0	280	125	60	82	0	317	546	863
480	0	1,175	0	730	0	1,391	749	745	687	0	1,904	3,572	5,476
481	0	737	0	379	0	882	469	394	346	0	1,116	2,091	3,208
482	0	943	0	426	0	1,151	523	310	401	0	1,369	2,385	3,754
483	0	452	0	155	0	558	246	94	140	0	607	1,039	1,646
484	0	2,810	0	2,757	0	3,096	2,361	3,738	2,581	0	5,567	11,777	17,343
485	1,095	149	1,738	331	210	235	209	262	337	0	3,523	1,042	4,565
486	1,137	0	1,805	288	218	53	133	237	299	0	3,448	721	4,169
487	0	1,464	0	990	0	1,731	902	943	953	0	2,454	4,529	6,983
488	0	3,632	0	1,785	0	4,407	2,057	1,400	1,687	0	5,417	9,551	14,968
489	567	85	540	148	109	131	113	127	151	0	1,449	521	1,970
490	1,011	1,830	1,604	1,385	194	2,225	1,241	1,281	1,340	0	6,024	6,087	12,111
491	0	1,821	0	961	0	2,190	1,092	872	901	0	2,782	5,055	7,837
492	832	166	792	219	160	244	187	181	221	0	2,168	832	3,000
493	0	722	0	472	0	849	473	502	444	0	1,194	2,269	3,463
494	0	948	0	764	0	1,102	614	774	742	0	1,713	3,233	4,945
495	427	741	406	625	82	874	593	749	589	0	2,280	2,805	5,085
496	0	827	0	361	0	1,011	457	258	338	0	1,188	2,063	3,251
497	609	400	967	595	117	456	443	769	569	0	2,688	2,237	4,926
498	0	2,972	0	2,308	0	3,415	2,151	2,770	2,168	0	5,280	10,504	15,784
499	326	675	310	559	63	793	530	667	527	0	1,932	2,517	4,450
500	0	1,248	0	595	0	1,518	696	445	563	0	1,843	3,221	5,064
501	0	657	0	745	0	730	475	822	734	0	1,402	2,761	4,163
502	0	191	0	91	0	233	107	68	86	0	282	493	775
503	0	1,605	0	779	0	1,950	904	601	736	0	2,384	4,191	6,575
504	0	2,404	0	1,149	0	2,924	1,342	863	1,087	0	3,552	6,215	9,768
505	0	691	0	781	0	767	499	862	769	0	1,471	2,897	4,369
506	0	273	0	282	0	298	236	388	264	0	555	1,187	1,742
507	0	261	0	125	0	318	146	93	118	0	386	674	1,060
508	1,738	0	2,759	441	334	81	203	362	457	0	5,270	1,103	6,373
509	0	2,357	0	1,178	0	2,856	1,345	945	1,114	0	3,535	6,259	9,794
510	0	3,190	0	1,620	0	3,859	1,834	1,327	1,530	0	4,809	8,550	13,359
511	0	564	0	553	0	635	416	643	534	0	1,117	2,228	3,345
512	0	351	0	167	0	427	196	125	158	0	518	906	1,424
513	0	264	0	125	0	322	147	94	119	0	390	681	1,071
514	0	339	0	431	0	352	339	638	403	0	770	1,732	2,502
515	1,162	322	1,845	611	223	410	405	669	602	0	4,163	2,086	6,249
516	487	4,838	774	4,025	94	5,556	3,599	4,815	3,803	0	10,218	17,774	27,991
517	0	238	0	87	0	293	130	56	80	0	326	559	885
518	0	1,048	0	499	0	1,275	584	373	472	0	1,547	2,705	4,252
519	0	384	0	435	0	426	277	480	428	0	818	1,612	2,430
520	0	208	0	99	0	253	116	74	94	0	307	536	843
521	0	910	0	414	0	1,111	505	302	389	0	1,324	2,308	3,632
522	0	2,355	0	1,369	0	2,810	1,452	1,316	1,290	0	3,724	6,868	10,593
523	3,732	7,137	5,924	5,903	716	8,514	5,237	6,234	5,655	0	23,412	25,639	49,051
524	0	1,151	0	549	0	1,400	642	410	519	0	1,699	2,971	4,670
525	0	1,632	0	714	0	1,995	903	511	668	0	2,346	4,077	6,423
526	964	194	1,531	362	185	276	235	318	364	0	3,237	1,192	4,429
527	328	0	520	83	63	15	38	68	86	0	994	208	1,202
528	0	1,406	0	734	0	1,697	820	624	693	0	2,141	3,834	5,974
529	0	455	0	183	0	558	250	124	169	0	638	1,101	1,739
530	670	3	1,064	171	129	35	80	141	177	0	2,037	432	2,470
531	0	383	0	183	0	466	214	137	173	0	566	990	1,556
532	1,733	6	2,401	413	333	88	206	349	429	0	4,887	1,072	5,959
533	0	128	0	61	0	156	71	45	57	0	189	330	518
534	443	1,167	704	741	85	1,425	743	648	710	0	3,141	3,526	6,667
535	0	1,807	0	1,354	0	2,100	1,216	1,471	1,291	0	3,161	6,078	9,239
536	0	160	0	69	0	196	89	49	65	0	229	398	628
537	811	3	1,288	207	156	41	96	170	214	0	2,464	522	2,986
538	0	1,023	0	614	0	1,216	642	610	578	0	1,637	3,047	4,684
539	0	274	0	124	0	334	152	90	117	0	397	692	1,090
540	1,296	0	2,058	329	249	60	151	270	341	0	3,932	823	4,755
541	601	2	954	153	115	30	71	126	159	0	1,825	386	2,211
542	0	406	0	487	0	427	389	709	456	0	893	1,980	2,873

Post-2030 Cumulative Baseline With Project Trip Generation (IBC TAZ)

ITAM	PRODUCTION					ATTRACTION					TOTAL	TOTAL	TOTAL
TAZ	HBW-P	WBO-P	HBO-P	OBO-P	SCH-P	HBW-A	WBO-A	HBO-A	OBO-A	SCH-A	PROD	ATTR	DAILY
543	1,252	29	1,988	396	240	79	198	396	403	0	3,906	1,076	4,982
544	3,801	782	6,034	1,430	730	1,108	931	1,250	1,439	0	12,777	4,728	17,505
545	849	365	1,348	554	163	445	402	638	539	0	3,279	2,024	5,304
546	0	4,353	0	2,637	0	5,169	2,742	2,634	2,484	0	6,990	13,030	20,020
TOTAL	**35,799**	**126,144**	**52,076**	**81,871**	**6,873**	**151,956**	**82,907**	**79,408**	**77,707**	**0**	**302,763**	**391,979**	**694,741**

Source: V:\11986-IBCVision\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\p30.Trips.Itam.100109.xls

General Plan Buildout Trip Generation (IBC TAZ)

ITAM	PRODUCTION					ATTRACTION					TOTAL	TOTAL	TOTAL
TAZ	HBW-P	WBO-P	HBO-P	OBO-P	SCH-P	HBW-A	WBO-A	HBO-A	OBO-A	SCH-A	PROD	ATTR	DAILY
395	0	1,162	0	440	0	1,429	636	289	404	0	1,603	2,758	4,360
396	0	1,377	0	526	0	1,693	753	347	484	0	1,903	3,277	5,181
397	0	780	0	476	0	917	527	542	439	0	1,256	2,426	3,682
398	0	546	0	306	0	649	354	326	282	0	852	1,611	2,464
399	0	1,187	0	474	0	1,456	651	321	438	0	1,660	2,867	4,527
400	0	1,398	0	491	0	1,724	760	304	445	0	1,889	3,234	5,122
401	0	878	0	345	0	1,079	482	232	318	0	1,223	2,110	3,334
402	0	536	0	212	0	658	294	143	196	0	748	1,290	2,038
403	0	1,152	0	2,503	0	957	1,728	4,168	2,334	0	3,655	9,188	12,843
404	0	1,344	0	591	0	1,642	744	424	553	0	1,934	3,363	5,297
405	0	912	0	363	0	1,119	501	246	336	0	1,275	2,202	3,477
406	0	399	0	149	0	491	218	97	137	0	549	944	1,492
407	0	333	0	121	0	410	182	78	111	0	454	780	1,234
408	0	789	0	341	0	964	439	249	318	0	1,130	1,970	3,100
409	0	983	0	419	0	1,203	543	296	391	0	1,403	2,433	3,835
410	0	471	0	179	0	579	257	117	164	0	650	1,118	1,768
411	403	1,549	640	767	77	1,910	921	588	721	0	3,437	4,140	7,577
412	0	406	0	155	0	499	222	102	143	0	561	966	1,527
413	0	1,054	0	422	0	1,293	579	287	391	0	1,476	2,550	4,026
414	0	1,435	0	714	0	1,727	870	668	660	0	2,149	3,926	6,075
415	0	317	0	129	0	389	174	88	119	0	446	771	1,217
416	0	362	0	138	0	442	213	118	123	0	501	896	1,397
417	0	725	0	341	0	883	404	253	322	0	1,066	1,862	2,928
418	0	693	0	280	0	850	381	191	259	0	973	1,681	2,654
419	0	133	0	41	0	164	72	23	37	0	174	295	469
420	0	921	0	350	0	1,132	504	230	321	0	1,271	2,187	3,457
421	0	716	0	304	0	877	395	214	283	0	1,020	1,769	2,788
422	2	427	3	151	0	524	245	117	134	0	584	1,020	1,604
423	0	1,471	0	701	0	1,790	820	524	663	0	2,172	3,797	5,969
424	0	261	0	74	0	324	140	37	64	0	334	565	899
425	0	1,106	0	527	0	1,346	617	394	499	0	1,633	2,856	4,489
426	0	1,029	0	480	0	1,252	579	366	451	0	1,508	2,648	4,157
427	0	312	0	130	0	383	172	90	121	0	442	766	1,208
428	0	582	0	237	0	712	327	176	218	0	820	1,434	2,253
429	0	930	0	355	0	1,143	509	234	327	0	1,285	2,213	3,498
430	0	1,541	0	681	0	1,882	853	491	639	0	2,222	3,864	6,086
431	0	873	0	344	0	1,071	486	244	315	0	1,217	2,116	3,333
432	0	323	0	140	0	395	178	100	131	0	463	804	1,266
433	0	376	0	129	0	465	204	79	117	0	506	865	1,371
434	0	630	0	254	0	773	346	173	235	0	884	1,528	2,412
435	0	227	0	87	0	279	124	57	80	0	314	540	854
436	0	660	0	291	0	806	365	209	272	0	951	1,653	2,604
437	0	546	0	251	0	666	306	188	236	0	797	1,395	2,192
438	0	927	0	358	0	1,139	508	238	330	0	1,285	2,215	3,500
439	0	1,467	0	577	0	1,802	805	388	533	0	2,045	3,527	5,572
440	0	423	0	140	0	522	229	83	126	0	563	961	1,524
441	0	795	0	575	0	917	578	708	533	0	1,369	2,736	4,105
442	0	327	0	127	0	402	179	84	117	0	454	782	1,237
443	0	271	0	297	0	291	245	420	278	0	568	1,234	1,802
444	0	161	0	68	0	197	89	48	64	0	229	398	627
445	0	369	0	135	0	454	201	86	123	0	503	864	1,368
446	588	766	934	435	113	970	487	308	416	0	2,836	2,182	5,018
447	0	320	0	146	0	387	191	132	133	0	466	843	1,309
448	0	397	0	294	0	459	284	351	275	0	692	1,369	2,061
449	0	589	0	218	0	725	322	141	200	0	807	1,387	2,195
450	0	277	0	92	0	342	150	54	82	0	369	629	998
451	0	262	0	124	0	319	146	92	117	0	386	675	1,061
452	0	772	0	402	0	932	451	343	379	0	1,174	2,105	3,279
453	0	749	0	356	0	912	418	266	337	0	1,106	1,933	3,039
454	0	360	0	172	0	438	201	128	162	0	532	930	1,462
455	0	412	0	161	0	506	226	108	148	0	573	988	1,562
456	0	2,318	0	1,627	0	2,683	1,667	1,985	1,507	0	3,945	7,842	11,787
457	0	566	0	226	0	694	311	153	209	0	792	1,367	2,159
458	0	498	0	221	0	608	276	160	207	0	719	1,251	1,970
459	0	1,268	0	631	0	1,535	728	514	595	0	1,899	3,372	5,270
460	0	756	0	320	0	925	417	225	298	0	1,076	1,865	2,940
461	0	535	0	196	0	659	292	126	179	0	731	1,255	1,987
462	0	1,457	0	586	0	1,787	800	399	543	0	2,043	3,529	5,571
463	0	213	0	89	0	261	117	62	82	0	302	523	824
464	376	417	597	272	72	528	274	203	264	0	1,735	1,268	3,003
465	0	358	0	137	0	440	196	90	126	0	495	853	1,348
466	0	152	0	134	0	170	121	176	125	0	286	591	877
467	0	592	0	282	0	720	330	211	267	0	874	1,528	2,402
468	0	602	0	231	0	740	330	153	212	0	833	1,435	2,268

General Plan Buildout Trip Generation (IBC TAZ)

ITAM	PRODUCTION					ATTRACTION					TOTAL	TOTAL	TOTAL
TAZ	HBW-P	WBO-P	HBO-P	OBO-P	SCH-P	HBW-A	WBO-A	HBO-A	OBO-A	SCH-A	PROD	ATTR	DAILY
469	0	435	0	204	0	530	242	151	192	0	639	1,115	1,754
470	0	750	0	852	0	798	704	1,237	795	0	1,602	3,534	5,136
471	0	1,201	0	596	0	1,452	702	507	558	0	1,797	3,219	5,015
472	0	170	0	64	0	209	93	42	59	0	234	403	638
473	0	553	0	222	0	679	304	151	205	0	775	1,338	2,113
474	0	1,178	0	449	0	1,449	645	296	413	0	1,628	2,802	4,430
475	0	133	0	287	0	111	198	477	268	0	421	1,055	1,476
476	0	365	0	146	0	448	201	99	135	0	511	882	1,393
477	0	619	0	253	0	759	341	174	235	0	873	1,510	2,382
478	0	1,630	0	777	0	1,983	909	581	735	0	2,406	4,207	6,614
479	0	228	0	89	0	280	125	59	82	0	317	546	863
480	0	1,175	0	730	0	1,391	749	745	687	0	1,904	3,572	5,476
481	0	914	0	331	0	1,126	498	211	302	0	1,245	2,137	3,382
482	0	945	0	426	0	1,153	524	310	401	0	1,371	2,387	3,758
483	0	453	0	155	0	559	246	94	140	0	608	1,039	1,646
484	0	2,810	0	2,757	0	3,096	2,361	3,738	2,581	0	5,567	11,777	17,343
485	670	369	1,064	313	129	485	280	235	308	0	2,545	1,308	3,853
486	1,137	0	1,805	288	218	53	133	237	299	0	3,448	721	4,169
487	0	1,464	0	990	0	1,731	902	943	953	0	2,454	4,529	6,983
488	0	3,632	0	1,785	0	4,407	2,057	1,400	1,687	0	5,417	9,551	14,968
489	0	279	0	161	0	332	178	166	150	0	440	826	1,267
490	1,011	1,935	1,604	1,435	194	2,352	1,299	1,319	1,387	0	6,179	6,358	12,537
491	0	1,699	0	965	0	2,029	1,046	927	907	0	2,664	4,910	7,573
492	0	481	0	181	0	592	263	119	166	0	663	1,140	1,802
493	0	722	0	472	0	849	473	502	444	0	1,194	2,269	3,463
494	0	948	0	764	0	1,102	614	774	742	0	1,713	3,233	4,945
495	0	1,033	0	602	0	1,223	677	653	556	0	1,634	3,110	4,744
496	0	829	0	361	0	1,013	458	258	338	0	1,189	2,066	3,255
497	609	400	967	595	117	456	443	769	569	0	2,688	2,237	4,926
498	0	2,972	0	2,308	0	3,415	2,151	2,770	2,168	0	5,280	10,504	15,784
499	0	944	0	522	0	1,126	594	526	485	0	1,466	2,730	4,196
500	0	1,248	0	595	0	1,518	696	445	563	0	1,843	3,221	5,064
501	0	657	0	745	0	730	475	822	734	0	1,402	2,761	4,163
502	0	191	0	91	0	233	107	68	86	0	282	493	775
503	0	1,605	0	779	0	1,950	904	601	736	0	2,384	4,191	6,575
504	0	2,404	0	1,149	0	2,924	1,342	863	1,087	0	3,552	6,215	9,768
505	0	691	0	781	0	767	499	862	769	0	1,471	2,897	4,369
506	0	273	0	282	0	298	236	388	264	0	555	1,187	1,742
507	0	261	0	125	0	318	146	93	118	0	386	674	1,060
508	1,738	0	2,759	441	334	81	203	362	457	0	5,270	1,103	6,373
509	0	2,357	0	1,178	0	2,856	1,345	945	1,114	0	3,535	6,259	9,794
510	0	3,190	0	1,620	0	3,859	1,834	1,327	1,530	0	4,809	8,550	13,359
511	0	564	0	553	0	635	416	643	534	0	1,117	2,228	3,345
512	0	351	0	167	0	427	196	125	158	0	518	906	1,424
513	0	264	0	125	0	322	147	94	119	0	390	681	1,071
514	0	339	0	431	0	352	339	638	403	0	770	1,732	2,502
515	1,162	322	1,845	611	223	410	405	669	602	0	4,163	2,086	6,249
516	487	4,838	774	4,025	94	5,556	3,599	4,815	3,803	0	10,218	17,774	27,991
517	0	134	0	38	0	167	72	19	33	0	172	291	462
518	0	575	0	274	0	699	320	205	259	0	849	1,484	2,332
519	0	384	0	435	0	426	277	480	428	0	818	1,612	2,430
520	0	208	0	99	0	253	116	74	94	0	307	536	843
521	0	910	0	414	0	1,111	505	302	389	0	1,324	2,308	3,632
522	0	2,355	0	1,369	0	2,810	1,452	1,316	1,290	0	3,724	6,868	10,593
523	3,732	7,137	5,924	5,903	716	8,514	5,237	6,234	5,655	0	23,412	25,639	49,051
524	0	1,151	0	549	0	1,400	642	410	519	0	1,699	2,971	4,670
525	0	1,916	0	849	0	2,340	1,061	612	796	0	2,765	4,810	7,575
526	792	194	1,258	318	152	268	214	282	319	0	2,714	1,083	3,797
527	328	0	520	83	63	15	38	68	86	0	994	208	1,202
528	0	1,378	0	657	0	1,677	768	491	621	0	2,035	3,558	5,592
529	0	608	0	255	0	744	335	179	238	0	863	1,496	2,359
530	0	0	0	0	0	0	0	0	0	0	0	0	0
531	0	638	0	304	0	776	356	227	288	0	942	1,647	2,589
532	1,733	6	2,401	413	333	88	206	349	429	0	4,887	1,072	5,959
533	0	128	0	61	0	156	71	45	57	0	189	330	518
534	0	1,335	0	709	0	1,608	785	615	669	0	2,044	3,677	5,721
535	0	2,084	0	1,057	0	2,522	1,198	865	999	0	3,141	5,583	8,725
536	0	160	0	69	0	196	89	49	65	0	229	398	628
537	0	271	0	302	0	290	247	428	283	0	572	1,248	1,820
538	0	1,023	0	614	0	1,216	642	610	578	0	1,637	3,047	4,684
539	0	274	0	124	0	334	152	90	117	0	397	692	1,090
540	1,296	0	2,058	329	249	60	151	270	341	0	3,932	823	4,755
541	0	229	0	109	0	278	127	81	103	0	338	590	928
542	0	406	0	487	0	427	389	709	456	0	893	1,980	2,873

General Plan Buildout Trip Generation (IBC TAZ)

ITAM	PRODUCTION					ATTRACTION					TOTAL	TOTAL	TOTAL
TAZ	HBW-P	WBO-P	HBO-P	OBO-P	SCH-P	HBW-A	WBO-A	HBO-A	OBO-A	SCH-A	PROD	ATTR	DAILY
543	0	434	0	271	0	513	280	283	255	0	705	1,331	2,036
544	3,801	1,499	6,034	1,772	730	1,980	1,331	1,506	1,762	0	13,835	6,578	20,413
545	0	568	0	379	0	664	388	432	353	0	947	1,838	2,785
546	0	4,353	0	2,637	0	5,169	2,742	2,634	2,484	0	6,990	13,030	20,020
TOTAL	**19,866**	**134,408**	**31,188**	**80,693**	**3,814**	**161,537**	**85,133**	**76,951**	**76,193**	**0**	**269,969**	**399,813**	**669,782**

Source: V:\11986-IBCVision\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline+ExistGP\Working Files\p30.Trips.Itam.100109.xls

Appendix B ICU Worksheets

Appendix B-1 **Existing Conditions ICU Worksheets**

Appendix B-2 **Existing With Project Conditions ICU Worksheets**

Appendix B-3 **2015 Cumulative Baseline No Project ICU Worksheets**

Appendix B-4 **2015 Cumulative Baseline With Project ICU Worksheets**

Appendix B-5 **Post-2030 Cumulative Baseline No Project ICU Worksheets**

Appendix B-6 **Post-2030 Cumulative Baseline With Project ICU Worksheets**

Appendix B-7 **Existing General Plan Build-out ICU Worksheets**

Appendix B-8 **Post-2030 Cumulative Baseline With Project (MPAH Network) ICU Worksheets**

Appendix B-1 Existing Conditions ICU Worksheets

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\NoProj\EXE-193\ICU\Y08NP-COM01-102809

10 . SR-55 Frontage Road SB Ramps at Paularino

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	442		90	
SBT	2	3200	658	.41*	555	.29*
SBR	0	0	210		286	
EBL	0	0	0		0	
EBT	2	3200	721	.27*	422	.17*
EBR	0	0	134		129	
WBL	1	1600	48	.03*	165	.10*
WBT	2	3200	149	.05	578	.18
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .71 .56

11 . SR-55 Frontage Road NB Ramps at Paularino

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	75		125	
NBT	2	3200	646	.23*	656	.24*
NBR	d	1600	113	.07	52	.03
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	1	1600	302	.19	256	.16*
EBT	2	3200	859	.27*	294	.09
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	126	.08	613	.31*
WBR	0	0	199	.12	375	
Right Turn Adjustment			WBR	.04*		

TOTAL CAPACITY UTILIZATION .54 .71

12 . SR-55 SB Frontage Road at Baker Street

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	412	{.26}*	173	
SBT	2	3200	121	.20	284	.23*
SBR	0	0	252	.16	434	.27
EBL	0	0	0		0	
EBT	2	3200	1100	.34*	488	.15
EBR	1	1600	242	.15	392	.25
WBL	1	1600	49	.03*	209	.13
WBT	2	3200	356	.11	933	.29*
WBR	0	0	0		0	
Right Turn Adjustment					Multi	.13*

TOTAL CAPACITY UTILIZATION .63 .65

13 . SR-55 NB Frontage Road at Baker Street

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	307		385	
NBT	2	3200	332	.29*	413	.33*
NBR	0	0	288		272	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	1	1600	527	.33*	261	.16*
EBT	2	3200	945	.30	325	.10
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	169	.05*	799	.25*
WBR	1	1600	116	.07	318	.20
Right Turn Adjustment			WBR	.02*		

TOTAL CAPACITY UTILIZATION .69 .74

50 . Red Hill Avenue at Paularino

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	9	.00	179	.06*
NBT	2	3200	65	.03*	567	.18
NBR	0	0	15		19	
SBL	1	1600	163	.10*	11	.01
SBT	2	3200	299	.12	902	.39*
SBR	0	0	80		356	
EBL	1	1600	86	.05	120	.08*
EBT	2	3200	880	.29*	71	.04
EBR	0	0	35		45	
WBL	1	1600	25	.02*	40	.03
WBT	2	3200	301	.11	289	.10*
WBR	0	0	43		31	

TOTAL CAPACITY UTILIZATION .44 .63

51 . Red Hill Avenue at Baker Street

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	156	.05	318	.10*
NBT	2	3200	666	.23*	514	.16
NBR	0	0	59		11	
SBL	1	1600	22	.01*	9	.01
SBT	2	3200	354	.13	645	.34*
SBR	0	0	76		438	
EBL	1.5		548	{.19}*	410	.13*
EBT	1.5	4800	351	.19	111	.07
EBR	1	1600	327	.20	80	.05
WBL	1	1600	5	.00	65	.04
WBT	2	3200	45	.02*	343	.12*
WBR	0	0	11		36	

TOTAL CAPACITY UTILIZATION .45 .69

52 . Red Hill Avenue at Bristol Street

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	110	.03	113	.04*
NBT	1.5	4800	342	.11*	137	.04
NBR	1.5		51		27	
SBL	2	3200	178	.06*	337	.11
SBT	2	3200	163	.05	533	.17*
SBR	1	1600	27	.02	242	.15
EBL	2	3200	281	.09*	105	.03*
EBT	3	4800	645	.13	629	.13
EBR	1	1600	75	.05	142	.09
WBL	2	3200	55	.02	126	.04
WBT	2.5	6400	306	{.09}*	972	.20*
WBR	1.5		325		150	

TOTAL CAPACITY UTILIZATION .35 .44

541 . Bear Street at Baker Street

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	77	.05*	251	.16*
NBT	1	1600	115	.09	238	.17
NBR	0	0	32		31	
SBL	2	3200	212	.07	167	.05
SBT	1	1600	200	.13*	217	.14*
SBR	2	3200	269	.08	531	.17
EBL	2	3200	451	.14	314	.10*
EBT	2	3200	867	.34*	602	.23
EBR	0	0	217		144	
WBL	1	1600	49	.03*	53	.03
WBT	2	3200	308	.10	1288	.40*
WBR	1	1600	81	.05	127	.08

TOTAL CAPACITY UTILIZATION .55 .80

542 . Bear Street at Paularino

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	129	.08*	32	.02
NBT	3	4800	799	.17	1506	.35*
NBR	0	0	5		161	
SBL	1	1600	17	.01	81	.05*
SBT	3	4800	715	.20*	827	.18
SBR	0	0	261		20	
EBL	1	1600	147	.09*	17	.01
EBT	1	1600	7	.04	5	.03*
EBR	0	0	57		48	
WBL	1	1600	8	.01	190	.12*
WBT	1	1600	33	.02*	24	.02
WBR	1	1600	54	.03	176	.11

TOTAL CAPACITY UTILIZATION .39 .55

545 . Bristol at Sunflower

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	160	.05*	566	.18
NBT	2.5	6400	727	{.15}	1586	.33*
NBR	1.5		300	{.13}	174	.11
SBL	2	3200	242	.08	148	.05*
SBT	3	4800	959	.20*	921	.19
SBR	1	1600	107	.07	230	.14
EBL	2	3200	95	.03	328	.10
EBT	2.5	6400	1120	{.25}*	1135	.24*
EBR	1.5		512		401	{.11}
WBL	2	3200	244	.08*	268	.08*
WBT	3	4800	271	.06	501	.10
WBR	1	1600	168	.11	279	.17

TOTAL CAPACITY UTILIZATION .58 .70

546 . Bristol at Anton

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	53	.02	462	.14
NBT	4	6400	1091	.17*	2022	.32*
NBR	f		1007		526	
SBL	2	3200	188	.06*	168	.05*
SBT	4	6400	1331	.21	1397	.22
SBR	1	1600	12	.01	48	.03
EBL	1	1600	7	.00	55	.03
EBT	1	1600	18	.01*	35	.02*
EBR	1	1600	6	.00	116	.07
WBL	3	4800	260	.05*	969	.20*
WBT	1	1600	9	.01	94	.06
WBR	1	1600	72	.05	271	.17

TOTAL CAPACITY UTILIZATION .29 .59

547 . Bristol and Paularino

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	21	.01	108	.07*
NBT	3	4800	875	.20*	1137	.26
NBR	0	0	67		103	
SBL	2	3200	287	.09*	259	.08
SBT	3	4800	886	.19	1461	.32*
SBR	0	0	17		94	
EBL	1	1600	194	.12	111	.07*
EBT	1	1600	283	.19*	171	.14
EBR	0	0	27		47	
WBL	1	1600	54	.03*	163	.10
WBT	1	1600	103	.06	462	.29*
WBR	1	1600	163	.10	278	.17

TOTAL CAPACITY UTILIZATION .51 .75

548 . Bristol Street at Baker Street

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	59	.02	181	.06
NBT	3	4800	385	.08*	857	.18*
NBR	1	1600	160	.10	142	.09
SBL	2	3200	299	.09*	243	.08*
SBT	3	4800	585	.12	856	.18
SBR	1	1600	119	.07	484	.30
EBL	2	3200	226	.07	232	.07*
EBT	2	3200	841	.28*	396	.15
EBR	0	0	65		93	
WBL	2	3200	146	.05*	239	.07
WBT	2	3200	257	.08	816	.26*
WBR	1	1600	257	.16	389	.24
Right Turn Adjustment					SBR	.05*

TOTAL CAPACITY UTILIZATION .50 .64

549 . Bristol Street at Newport Boulevard Southbound

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	133	.04*	577	.18*
NBT	3	4800	674	.14	1205	.25
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	747	.16*	646	.13*
SBR	d	1600	315	.20	477	.30
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			SBR	.04*	SBR	.17*

TOTAL CAPACITY UTILIZATION .24 .48

550 . Bristol Street at Newport Boulevard Northb

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	462	.10	1238	.26*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	681	.14*	684	.14
SBR	0	0	0		0	
EBL	1.5		306	{.13}*	378	.12*
EBT	0	4800	0	.13	0	
EBR	1.5		303		198	{.03}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .27 .38

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\NoProj\EXE-193\ICU\Y08NP-COM02-102809

715 . Bristol at I-405 NB Off Ramps

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6400	1584	.25*	1936	.30*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	5	8000	1688	.21	2242	.29
SBR	0	0	14		63	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	2	3200	47	.01	305	.10
WBL	1.5		107		199	
WBT	1.5	4800	61	.04*	292	.10*
WBR	2	3200	570	.18	835	.26
Right Turn Adjustment			WBR	.14*	Multi	.25*
TOTAL CAPACITY UTILIZATION				.43		.65

716 . Bristol at I-405 SB Off Ramps

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	141	.09*	192	.12*
NBT	4	6400	1090	.17	1891	.30
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	936	.20*	1569	.33*
SBR	f		834		1136	
EBL	3	4800	708	.15*	648	.14*
EBT	0	0	0		0	
EBR	1	1600	505	.32	192	.12
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.10*		
TOTAL CAPACITY UTILIZATION				.54		.59

717 . Bear Street at SR-73 SB Ramps

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3200	391	.24*	911	.36*
NBR	0	0	380		242	
SBL	2	3200	586	.18*	961	.30*
SBT	2	3200	479	.15	1164	.36
SBR	0	0	0		0	
EBL	1.5		100	.06*	222	{.13}*
EBT	0	3200	0		0	.13
EBR	0.5		175	.11	193	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
TOTAL CAPACITY UTILIZATION				.48		.79

718 . Bear Street at SR-73 NB Ramps

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	110	.07*	325	.20*
NBT	2	3200	324	.10	602	.19
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	831	.20*	1079	.29*
SBR	0	0	107		291	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	139	.09*	243	.15*
WBT	0	0	0		0	
WBR	2	3200	469	.15	1039	.32
TOTAL CAPACITY UTILIZATION				.36		.64

721 . Flower at Sunflower

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	20	.01*	42	.03
NBT	2	3200	33	.01	324	.10*
NBR	1	1600	24	.02	55	.03
SBL	1	1600	120	.08	47	.03*
SBT	2	3200	191	.10*	123	.08
SBR	0	0	118		169	.11
EBL	2	3200	45	.01	220	.07*
EBT	3	4800	616	.14*	597	.14
EBR	0	0	39		56	
WBL	2	3200	36	.01*	48	.02
WBT	3	4800	247	.06	1024	.23*
WBR	0	0	23		78	

TOTAL CAPACITY UTILIZATION .26 .43

722 . Anton at Sunflower

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	9	.01*	9	.01*
NBT	0	0	0		0	
NBR	2	3200	200	.06	463	.14
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	898	.19*	671	.14*
EBR	0	0	31		18	
WBL	1	1600	225	.14*	296	.19*
WBT	3	4800	325	.07	1289	.27
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .34 .34

726 . Main Street at Sunflower

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	227	.07*	956	.30*
NBT	3	4800	202	.04	831	.17
NBR	0	0	3		1	
SBL	1	1600	9	.01	1	.00
SBT	2	3200	546	.17*	304	.10*
SBR	1	1600	249	.16	586	.37
EBL	1.5		481	{.15}*	544	{.17}*
EBT	0.5	3200	0	.15	0	.17
EBR	2	3200	649	.20	462	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.14*

TOTAL CAPACITY UTILIZATION .39 .71

735 . Newport Boulevard NB at Del Mar

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		79		115	
NBT	2.5	4800	1149	.26*	719	.17*
NBR	d	1600	90	.06	115	.07
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	742	.23*	457	.14*
EBT	2	3200	293	.09	388	.12
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	170	.05*	245	.08*
WBR	1	1600	373	.23	203	.13
Right Turn Adjustment			WBR	.18*	WBR	.05*

TOTAL CAPACITY UTILIZATION .72 .44

736 . Newport Boulevard SB at Fair Drive/Del Mar

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	137	.09	270	.17
SBT	3	4800	434	.09*	1231	.26*
SBR	f		384		1083	
EBL	0	0	0		0	
EBT	4	6400	823	.13*	539	.09*
EBR	0	0	31		38	
WBL	1	1600	101	.06*	71	.04*
WBT	2	3200	164	.05	287	.09
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .28 .39

737 . Newport Boulevard NB at Mesa Road

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	13	.01	16	.01
NBT	2	3200	401	.13*	359	.11*
NBR	d	1600	172	.11	98	.06
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	60	.02	59	.02*
EBT	1	1600	153	.10*	271	.17
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1600	72	.08	252	.19*
WBR	0	0	52		44	

TOTAL CAPACITY UTILIZATION .23 .32

738 . Newport Boulevard SB at Mesa Road

2008 NO PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	200	.13	330	.21
SBT	4	6400	888	.14*	2303	.36*
SBR	1	1600	0	.00	0	.00
EBL	0	0	0		0	
EBT	1	1600	0	.00*	0	.00*
EBR	1	1600	0	.00	0	.00
WBL	1	1600	76	.05*	271	.17*
WBT	1	1600	0	.00	0	.00
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .19 .53

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\NoProj\EXE-193\ICU\Y08NP-IRV01-102809

42 . Red Hill Avenue at Barranca Parkway/Dyer R

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	158	.05*	569	.17
NBT	3	5100	460	.11	1901	.41*
NBR	0	0	81		212	
SBL	2	3400	498	.15	467	.14*
SBT	3	5100	1105	.24*	523	.13
SBR	0	0	144		164	
EBL	1	1700	223	.13	206	.12*
EBT	3	5100	1035	.25*	728	.16
EBR	0	0	253		111	
WBL	1	1700	394	.23*	113	.07
WBT	3	5100	598	.18	725	.21*
WBR	0	0	299		579	.34
Right Turn Adjustment					WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.82		.95

43 . Red Hill Avenue at Deere Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	97	.06*	30	.02
NBT	3	5100	655	.13	2408	.47*
NBR	d	1700	68	.04	26	.02
SBL	1	1700	75	.04	23	.01*
SBT	3	5100	1480	.29*	768	.15
SBR	d	1700	123	.07	13	.01
EBL	1	1700	11	.01	106	.06
EBT	1	1700	38	.04*	79	.10*
EBR	0	0	34		99	
WBL	1	1700	13	.01*	61	.04*
WBT	1	1700	19	.01	50	.03
WBR	1	1700	29	.02	221	.13
Right Turn Adjustment					WBR	.04*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.45		.71

44 . Red Hill Avenue at Alton Parkway

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	78	.05	25	.01
NBT	3	5100	657	.18*	1828	.41*
NBR	0	0	274		280	
SBL	1	1700	281	.17*	189	.11*
SBT	3	5100	1175	.23	741	.15
SBR	d	1700	93	.05	16	.01
EBL	1	1700	9	.01	41	.02
EBT	2	3400	52	.02*	208	.06*
EBR	1	1700	29	.02	82	.05
WBL	2	3400	306	.09*	414	.12*
WBT	1	1700	174	.10	117	.07
WBR	1	1700	104	.06	620	.36
Right Turn Adjustment					WBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.51		.87

45 . Red Hill Avenue at McGaw Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	477	.14*	132	.04
NBT	3	5100	953	.24	1704	.36*
NBR	0	0	277		121	
SBL	2	3400	229	.07	54	.02*
SBT	3	5100	1167	.23*	1233	.24
SBR	d	1700	54	.03	66	.04
EBL	1	1700	14	.01	92	.05
EBT	2	3400	33	.02*	104	.06*
EBR	0	0	87	.05	339	.20
WBL	2	3400	179	.05*	284	.08*
WBT	2	3400	84	.04	66	.04
WBR	0	0	52		237	.14
Right Turn Adjustment					Multi	.06*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.49		.63

47 . Red Hill Avenue at MacArthur Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	67	.04*	324	.19*
NBT	2	3400	631	.19	756	.22
NBR	f		29		60	
SBL	2	3400	243	.07	410	.12
SBT	2	3400	847	.25*	684	.20*
SBR	f		364		1001	
EBL	2	3400	969	.29*	706	.21*
EBT	2	3400	530	.16	313	.09
EBR	1	1700	161	.09	168	.10
WBL	1	1700	64	.04	88	.05
WBT	2	3400	390	.11*	800	.24*
WBR	f		507		636	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .89

48 . Red Hill Avenue at Sky Park North

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	27	.02	23	.01
NBT	2	3400	617	.18*	822	.24*
NBR	d	1700	69	.04	32	.02
SBL	1	1700	164	.10*	90	.05*
SBT	2	3400	738	.22	807	.24
SBR	d	1700	119	.07	47	.03
EBL	1	1700	15	.01*	65	.04*
EBT	1	1700	26	.02	34	.02
EBR	1	1700	14	.01	41	.02
WBL	1	1700	18	.01	103	.06
WBT	1	1700	24	.07*	84	.19*
WBR	0	0	92		237	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .41 .57

49 . Red Hill Avenue at Main Street

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	196	.06*	308	.09*
NBT	2	3400	644	.19	644	.19
NBR	1	1700	376	.22	217	.13
SBL	2	3400	109	.03	169	.05
SBT	2	3400	508	.18*	689	.30*
SBR	0	0	113		344	
EBL	2	3400	168	.05	203	.06
EBT	3	5100	1103	.28*	987	.27*
EBR	0	0	301		405	
WBL	2	3400	171	.05*	396	.12*
WBT	3	5100	363	.09	1215	.26
WBR	0	0	74		106	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .83

70 . Gillette Avenue at Main Street

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	61	.02*	291	.09*
NBT	1	1700	5	.00	23	.01
NBR	1	1700	32	.02	476	.28
SBL	2	3400	26	.01	232	.07
SBT	1	1700	21	.01*	17	.01*
SBR	d	1700	32	.02	257	.15
EBL	2	3400	309	.09*	80	.02*
EBT	4	6800	914	.13	1221	.18
EBR	f		341		78	
WBL	2	3400	237	.07	60	.02
WBT	3	5100	743	.19*	898	.18*
WBR	0	0	201		22	
Right Turn Adjustment					Multi	.35*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .36 .70

71 . Armstrong Avenue at Barranca Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	33	.01*	194	.06*
NBT	0	0	0		0	
NBR	1	1700	22	.01	217	.13
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	1	1700	3	.00	41	.02
EBT	3	5100	1210	.24*	1120	.22*
EBR	d	1700	113	.07	107	.06
WBL	1	1700	199	.12*	106	.06*
WBT	3	5100	1423	.28	1202	.24
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .42 .41

77 . MacArthur Boulevard at Sky Park East

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06*	90	.05
NBT	3	5100	825	.16	1428	.28*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6800	806	.14*	707	.11
SBR	0	0	148		63	
EBL	2	3400	34	.01*	169	.05*
EBT	0	0	0		0	
EBR	1	1700	65	.04	253	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .26 .38

78 . MacArthur Boulevard at Main Street

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	702	.21*	592	.17*
NBT	4	6800	649	.10	1013	.15
NBR	f		1269		448	
SBL	2	3400	382	.11	232	.07
SBT	4	6800	472	.07*	887	.13*
SBR	1	1700	84	.05	83	.05
EBL	1	1700	63	.04	73	.04
EBT	3	5100	576	.11*	577	.11*
EBR	1	1700	269	.16	530	.31
WBL	2	3400	201	.06*	574	.17*
WBT	3	5100	415	.08	630	.12
WBR	f		136		551	
Right Turn Adjustment					EBR	.03*
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for EBR						

TOTAL CAPACITY UTILIZATION .50 .66

79 . MacArthur Boulevard at I-405 NB Ramps

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1888	.28*	1679	.25*
NBR	2	3400	242	.07	930	.27
SBL	2	3400	195	.06*	597	.18*
SBT	4	6800	890	.13	1368	.20
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	844	.25*	553	.16*
WBT	0	0	0		0	
WBR	2	3400	707	.21	297	.09
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .64 .64

80 . MacArthur Boulevard at I-405 SB Ramps

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	968	.14*	1928	.28*
NBR	1	1700	333	.20	650	.38
SBL	2	3400	196	.06*	585	.17*
SBT	4	6800	1119	.16	1084	.16
SBR	1	1700	392	.23	312	.18
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	1040	.31*	633	.19*
WBT	1	1700	254	.15	273	.16
WBR	f		1102		659	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .56 .69

82 . MacArthur Boulevard at Michelson Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	208	.12*	129	.08
NBT	4	6800	1060	.16	1474	.22*
NBR	1	1700	213	.13	97	.06
SBL	2	3400	305	.09	693	.20*
SBT	4	6800	1899	.28*	1602	.24
SBR	0	0	0		0	
EBL	2	3400	251	.07*	372	.11
EBT	2	3400	150	.06	158	.07*
EBR	0	0	50		85	
WBL	2	3400	66	.02	426	.13*
WBT	1	1700	59	.03*	84	.05
WBR	1	1700	126	.07	686	.40
Right Turn Adjustment					WBR	.11*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION .55 .78

83 . MacArthur Boulevard at Douglas Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1350	.20*	1427	.21
NBR	0	0	34		30	
SBL	2	3400	277	.08*	145	.04
SBT	4	6800	1559	.23	1886	.28*
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	17	.01*	22	.01*
WBT	0	0	0		0	
WBR	1	1700	94	.06	163	.10
Right Turn Adjustment					WBR	.04*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .34 .38

87 . Dupont Drive at Michelson Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	39	.02*	192	.11*
NBT	2	3400	19	.01	26	.02
NBR	0	0	12		56	.03
SBL	1	1700	14	.01	81	.05
SBT	2	3400	12	.01*	31	.02*
SBR	0	0	16	.01	102	.06
EBL	1	1700	58	.03	39	.02*
EBT	2	3400	480	.22*	443	.14
EBR	0	0	278		47	
WBL	1	1700	19	.01*	19	.01
WBT	3	5100	219	.05	830	.17*
WBR	0	0	61		39	
Right Turn Adjustment					SBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .31 .39

97 . Von Karman Avenue/Tustin Ranch Road at Bar

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	112	.03*	438	.13*
NBT	2	3400	0	.00	0	.00
NBR	d	1700	59	.03	636	.37
SBL	2	3400	0	.00	0	.00
SBT	2	3400	0	.00*	0	.00*
SBR	2	3400	83	.02	33	.01
EBL	1	1700	0	.00	0	.00
EBT	3	5100	661	.13*	1117	.22*
EBR	d	1700	324	.19	165	.10
WBL	2	3400	837	.25*	164	.05*
WBT	3	5100	1130	.22	869	.17
WBR	1	1700	25	.01	5	.00
Right Turn Adjustment			EBR	.04*	NBR	.20*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .50 .65

98 . Von Karman Avenue at Alton Parkway

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	50	.03*	175	.10
NBT	2	3400	216	.06	859	.25*
NBR	d	1700	35	.02	462	.27
SBL	1	1700	30	.02	165	.10*
SBT	2	3400	911	.27*	236	.07
SBR	d	1700	34	.02	59	.03
EBL	1	1700	30	.02*	40	.02
EBT	2	3400	207	.06	882	.26*
EBR	d	1700	66	.04	81	.05
WBL	1	1700	366	.22	86	.05*
WBT	2	3400	951	.28*	478	.14
WBR	d	1700	131	.08	71	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .71

99 . Von Karman Avenue at McGaw Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	54	.03*	40	.02
NBT	2	3400	250	.07	1773	.52*
NBR	d	1700	23	.01	109	.06
SBL	1	1700	38	.02	27	.02*
SBT	2	3400	1213	.36*	359	.11
SBR	d	1700	55	.03	22	.01
EBL	1	1700	11	.01	69	.04
EBT	2	3400	108	.05*	355	.12*
EBR	0	0	45		62	
WBL	1	1700	86	.05*	23	.01*
WBT	2	3400	253	.08	157	.07
WBR	0	0	20		72	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .72

100 . Von Karman Avenue at Main Street

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	84	.02*	274	.08
NBT	2	3400	213	.06	969	.29*
NBR	1	1700	62	.04	215	.13
SBL	1	1700	84	.05	115	.07*
SBT	2	3400	1046	.31*	448	.13
SBR	1	1700	242	.14	151	.09
EBL	2	3400	229	.07*	544	.16
EBT	3	5100	520	.10	1405	.28*
EBR	f		280		150	
WBL	2	3400	281	.08	94	.03*
WBT	3	5100	844	.18*	579	.13
WBR	0	0	79		87	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .63 .72

101 . Von Karman Avenue at Morse Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	237	.07*	75	.02
NBT	2	3400	341	.13	1195	.35*
NBR	0	0	97		11	
SBL	1	1700	140	.08	25	.01*
SBT	2	3400	1019	.30*	623	.18
SBR	f		151		27	
EBL	1	1700	9	.01*	55	.03*
EBT	1	1700	9	.01	2	.00
EBR	f		49		238	
WBL	1	1700	10	.01	85	.05
WBT	1	1700	2	.02*	12	.10*
WBR	0	0	28		159	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .54

102 . Von Karman Avenue at Michelson Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	57	.03*
NBT	2	3400	801	.24*	873	.26
NBR	1	1700	72	.04	92	.05
SBL	1	1700	145	.09*	232	.14
SBT	2	3400	615	.21	1248	.41*
SBR	0	0	92		162	
EBL	1	1700	129	.08*	173	.10*
EBT	2	3400	155	.06	431	.15
EBR	0	0	36		84	
WBL	1	1700	165	.10	158	.09
WBT	2	3400	307	.09*	540	.16*
WBR	f		314		297	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .75

103 . Von Karman Avenue at Dupont Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	66	.04	33	.02*
NBT	2	3400	868	.26*	962	.30
NBR	0	0	24		56	
SBL	1	1700	41	.02*	54	.03
SBT	2	3400	675	.20	1191	.35*
SBR	1	1700	24	.01	20	.01
EBL	1	1700	4	.00	19	.01
EBT	2	3400	50	.03*	104	.06*
EBR	0	0	64	.04	133	.08
WBL	1	1700	58	.03*	40	.02*
WBT	2	3400	63	.03	78	.05
WBR	0	0	45		90	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .39 .50

104 . Von Karman Avenue at Martin

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	26	.02	18	.01*
NBT	2	3400	862	.25*	881	.26
NBR	1	1700	12	.01	34	.02
SBL	1	1700	15	.01*	27	.02
SBT	2	3400	648	.23	1234	.39*
SBR	0	0	124		97	
EBL	2	3400	47	.01*	138	.04*
EBT	1	1700	1	.01	3	.03
EBR	0	0	19		46	
WBL	1	1700	4	.00	29	.02
WBT	1	1700	2	.01*	9	.03*
WBR	0	0	8		49	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .33 .52

112 . Myford Road at Michelle Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	45	.01*	19	.01*
NBT	0	0	0		0	
NBR	1	1700	71	.04	243	.14
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	58	.02*	450	.13*
EBR	d	1700	10	.01	20	.01
WBL	1	1700	131	.08*	47	.03*
WBT	2	3400	214	.06	60	.02
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.11*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .16 .33

113 . Myford Road at Walnut Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	6	.00	98	.06
NBT	1	1700	5	.00*	62	.04*
NBR	f		66		275	
SBL	2	3400	67	.02*	93	.03*
SBT	1	1700	18	.01	8	.00
SBR	1	1700	100	.06	82	.05
EBL	1	1700	63	.04	37	.02*
EBT	2	3400	794	.23*	722	.21
EBR	d	1700	41	.02	10	.01
WBL	2	3400	323	.10*	40	.01
WBT	2	3400	639	.19	1006	.30*
WBR	1	1700	161	.09	68	.04
Right Turn Adjustment					SBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .40 .46

114 . Millikan Avenue/District Way at Barranca P

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	43	.03*	77	.05
NBT	2	3400	14	.00	65	.02*
NBR	d	1700	22	.01	260	.15
SBL	2	3400	79	.02	390	.11*
SBT	0.5	3400	47	{.03}*	44	{.03}
SBR	1.5		81		137	{.01}
EBL	2	3400	36	.01*	120	.04
EBT	3	5100	434	.09	1320	.26*
EBR	d	1700	126	.07	34	.02
WBL	1	1700	103	.06	11	.01*
WBT	2	3400	1509	.44*	588	.17
WBR	1	1700	135	.08	571	.34
Right Turn Adjustment					Multi	.15*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .56 .60

115 . Millikan Avenue at Alton Parkway

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	3	.00	3	.00
NBT	1	1700	2	.00*	3	.00*
NBR	1	1700	5	.00	6	.00
SBL	1	1700	37	.02*	83	.05*
SBT	1	1700	3	.00	1	.00
SBR	1	1700	102	.06	142	.08
EBL	1	1700	59	.03*	191	.11
EBT	2	3400	176	.05	978	.29*
EBR	d	1700	3	.00	2	.00
WBL	1	1700	19	.01	2	.00
WBT	2	3400	924	.27*	401	.12
WBR	d	1700	134	.08	59	.03
Right Turn Adjustment			SBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .39 .39

116 . Cartwright Road at Main Street

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	21	.01*	78	.05*
NBT	1	1700	1	.00	2	.00
NBR	1	1700	26	.02	218	.13
SBL	2	3400	7	.00	91	.03
SBT	1	1700	3	.01*	3	.04*
SBR	0	0	14		58	
EBL	1	1700	44	.03*	19	.01
EBT	3	5100	469	.11	1670	.33*
EBR	0	0	71		24	
WBL	2	3400	200	.06	36	.01*
WBT	3	5100	1217	.25*	922	.18
WBR	0	0	77		8	
Right Turn Adjustment					NBR	.06*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .35 .54

119 . Teller Avenue at Michelson Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	27	.02*	85	.05*
NBT	1	1700	2	.00	0	.00
NBR	1	1700	26	.02	422	.25
SBL	1	1700	14	.01	10	.01
SBT	1	1700	3	.00*	2	.00*
SBR	1	1700	6	.00	4	.00
EBL	1	1700	4	.00	3	.00
EBT	3	5100	279	.05*	1023	.20*
EBR	1	1700	61	.04	125	.07
WBL	1	1700	489	.29*	36	.02*
WBT	3	5100	1450	.28	631	.12
WBR	1	1700	31	.02	2	.00
Right Turn Adjustment					NBR	.19*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .41 .51

126 . Jamboree Road at Bryan Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	104	.03*	263	.08
NBT	4	6800	659	.10	2030	.30*
NBR	1	1700	98	.06	338	.20
SBL	2	3400	162	.05	50	.01*
SBT	4	6800	2297	.34*	862	.13
SBR	d	1700	98	.06	149	.09
EBL	2	3400	61	.02	215	.06
EBT	2	3400	235	.07*	394	.12*
EBR	d	1700	230	.14	127	.07
WBL	2	3400	470	.14*	263	.08*
WBT	2	3400	371	.11	374	.11
WBR	1	1700	196	.12	154	.09
Right Turn Adjustment			EBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .56

127 . Jamboree Road at El Camino Real

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	244	.07*	481	.14
NBT	4	6800	737	.11	1734	.26*
NBR	1	1700	505	.30	232	.14
SBL	1	1700	139	.08	77	.05*
SBT	4	6800	2572	.38*	884	.13
SBR	1	1700	106	.06	171	.10
EBL	1	1700	69	.04	189	.11
EBT	1	1700	122	.07*	129	.08*
EBR	2	3400	238	.07	313	.09
WBL	2	3400	275	.08*	638	.19*
WBT	2	3400	42	.02	215	.11
WBR	0	0	35		162	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .63

128 . Jamboree Road at I-5 NB Ramps

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1209	.24	2654	.52*
NBR	f		671		600	
SBL	0	0	0		0	
SBT	3	5100	1806	.35*	1476	.29
SBR	f		474		480	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		879	.26*	302	.18*
WBT	0	5100	0		0	
WBR	1.5		452	{.18}	897	.26
Right Turn Adjustment					WBR	.08*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .83

129 . Jamboree Road at I-5 SB Ramps

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1435	.28	2536	.50*
NBR	f		367		915	
SBL	0	0	0		0	
SBT	3	5100	2027	.40*	1344	.26
SBR	f		506		434	
EBL	1.5		441	.26*	684	{.21}*
EBT	0	5100	0		0	{.21}
EBR	1.5		988	.29	691	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.03*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .76

130 . Jamboree Road at Michelle Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	115	.07*	73	.04
NBT	3	5100	1390	.27	2929	.57*
NBR	d	1700	0	.00	1	.00
SBL	1	1700	2	.00	11	.01*
SBT	3	5100	3278	.64*	1944	.38
SBR	d	1700	493	.29	151	.09
EBL	2	3400	106	.03*	508	.15*
EBT	1	1700	1	.00	3	.00
EBR	1	1700	58	.03	153	.09
WBL	1	1700	0	.00	1	.00
WBT	1	1700	0	.00*	1	.00*
WBR	0	0	1		3	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .79 .78

131 . Jamboree Road SB at Walnut Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	205	.06	242	.07
SBT	2	3400	652	.19*	516	.15*
SBR	1	1700	228	.13	163	.10
EBL	0	0	0		0	
EBT	3	5100	297	.06*	484	.09*
EBR	1	1700	265	.16	317	.19
WBL	2	3400	310	.09*	206	.06*
WBT	3	5100	389	.08	730	.14
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.10*	EBR	.10*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .49 .45

132 . Jamboree Road NB at Walnut Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	294	.09*	668	.20*
NBT	2	3400	293	.09	454	.13
NBR	d	1700	95	.06	433	.25
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3400	46	.01*	141	.04*
EBT	3	5100	437	.09	651	.13
EBR	0	0	0		0	
WBL	0	0	4		0	
WBT	3	5100	749	.15*	643	.13*
WBR	1	1700	288	.17	258	.15
Right Turn Adjustment			WBR	.02*	NBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.32		.44

133 . Jamboree Road at Edinger Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	98	.03	215	.06
NBT	0	0	0		0	
NBR	1	1700	55	.03	276	.16
SBL	2	3400	160	.05*	259	.08*
SBT	0	0	0		0	
SBR	f		884		282	
EBL	2	3400	204	.06*	565	.17*
EBT	3	5100	398	.10	813	.18
EBR	0	0	114		100	
WBL	2	3400	168	.05	91	.03
WBT	3	5100	945	.19*	569	.11*
WBR	1	1700	265	.16	139	.08
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.35		.49

134 . Loop Road/Park Avenue at Warner Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	14	.01	15	.01
NBT	1	1700	14	.01*	92	.05*
NBR	1	1700	95	.06	488	.29
SBL	1	1700	225	.13*	280	.16*
SBT	2	3400	185	.05	394	.12
SBR	1	1700	806	.47	74	.04
EBL	1	1700	5	.00	10	.01
EBT	2	3400	54	.02	1177	.35*
EBR	1	1700	5	.00	17	.01
WBL	2	3400	64	.02	178	.05*
WBT	2	3400	225	.07*	67	.02
WBR	1	1700	9	.01	7	.00
Right Turn Adjustment			Multi	.35*	NBR	.20*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.61		.86

136 . Jamboree Road at Barranca Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	144	.04*	212	.06
NBT	4	6800	825	.12	2987	.44*
NBR	f		91		220	
SBL	2	3400	318	.09	303	.09*
SBT	4	6800	2996	.44*	1324	.19
SBR	f		974		272	
EBL	2.5		162	.05	981	.19
EBT	2.5	8500	453	.09*	631	.19*
EBR	1	1700	90	.05	105	.06
WBL	2	3400	225	.07	206	.06
WBT	3	5100	671	.13*	614	.12*
WBR	f		173		413	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing

TOTAL CAPACITY UTILIZATION .75 .89

137 . Jamboree Road at Beckman Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	35	.02*	8	.00
NBT	4	6800	1005	.16	3231	.48*
NBR	0	0	104		31	
SBL	1	1700	59	.03	31	.02*
SBT	4	6800	3152	.49*	1595	.24
SBR	0	0	184		28	
EBL	1	1700	37	.02*	212	.12*
EBT	1	1700	7	.00	20	.01
EBR	d	1700	3	.00	11	.01
WBL	1	1700	78	.05	50	.03
WBT	1	1700	32	.04*	10	.03*
WBR	0	0	40		46	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .70

138 . Jamboree Road at Alton Parkway

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	272	.08*	182	.05
NBT	4	6800	896	.13	2733	.40*
NBR	1	1700	128	.08	186	.11
SBL	2	3400	152	.04	176	.05*
SBT	4	6800	2687	.43*	1479	.24
SBR	0	0	263		133	
EBL	2	3400	41	.01*	207	.06
EBT	3	5100	133	.04	1055	.24*
EBR	0	0	50		156	
WBL	2	3400	160	.05	202	.06*
WBT	3	5100	780	.15*	366	.07
WBR	d	1700	132	.08	162	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .80

139 . Jamboree Road at McGaw Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	187	.06*	62	.02
NBT	4	6800	1256	.19	2866	.43*
NBR	0	0	32		55	
SBL	2	3400	18	.01	16	.00
SBT	4	6800	2586	.41*	1674	.25
SBR	0	0	210		32	
EBL	1	1700	19	.01*	229	.13*
EBT	2	3400	19	.01	142	.08
EBR	0	0	20	.01	186	.11
WBL	1	1700	29	.02	32	.02
WBT	2	3400	65	.02*	24	.01*
WBR	0	0	13		23	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .62

140 . Jamboree Road at Kelvin Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	132	.08*	104	.06
NBT	4	6800	1374	.22	2986	.47*
NBR	0	0	102		207	
SBL	1	1700	8	.00	10	.01*
SBT	4	6800	2958	.44*	2124	.31
SBR	d	1700	21	.01	23	.01
EBL	1	1700	26	.02*	22	.01
EBT	1	1700	7	.00	10	.01*
EBR	d	1700	80	.05	105	.06
WBL	1	1700	56	.03	97	.06*
WBT	1	1700	6	.01*	11	.01
WBR	0	0	6		7	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .60

141 . Jamboree Road at Main Street

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	601	.18*	470	.14*
NBT	4	6800	1428	.21	2480	.36
NBR	f		201		481	
SBL	2	3400	422	.12	268	.08
SBT	4	6800	2279	.34*	2050	.30*
SBR	1	1700	528	.31	140	.08
EBL	2	3400	89	.03	393	.12
EBT	3	5100	214	.04*	1057	.21*
EBR	f		191		715	
WBL	2	3400	637	.19*	592	.17*
WBT	3	5100	625	.12	296	.06
WBR	f		82		270	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .80 .87

143 . Jamboree Road at I-405 NB Ramps

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1611	.32*	3240	.64*
NBR	f		494		899	
SBL	0	0	0		0	
SBT	4	6800	1599	.24	2231	.33
SBR	f		1623		1144	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	3	5100	1451	.28*	643	.13*
WBT	0	0	0		0	
WBR	f		861		222	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .82

144 . Jamboree Road at I-405 SB Ramps

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1271	.19	2549	.37*
NBR	f		475		974	
SBL	0	0	0		0	
SBT	4	6800	2752	.40*	2388	.35
SBR	f		271		641	
EBL	1.5		822	{.34}*	1504	.44*
EBT	0	6800	0	.34	0	
EBR	2.5		1513		608	.18
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .79 .86

145 . Jamboree Road at Michelson Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	182	.11*	66	.04
NBT	4	6800	1271	.19	2135	.31*
NBR	1	1700	157	.09	418	.25
SBL	2	3400	557	.16	857	.25*
SBT	4	6800	2370	.35*	1759	.26
SBR	f		649		433	
EBL	2	3400	184	.05*	1001	.29*
EBT	2	3400	142	.06	302	.13
EBR	0	0	52		153	
WBL	2	3400	198	.06	228	.07
WBT	2	3400	346	.10*	224	.07*
WBR	f		319		542	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.66		.97

146 . Jamboree Road at Dupont Road

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	156	.09*	72	.04
NBT	4	6800	1379	.20	2224	.33*
NBR	1	1700	8	.00	27	.02
SBL	1	1700	49	.03	174	.10*
SBT	3	5100	2163	.42*	1790	.35
SBR	d	1700	460	.27	167	.10
EBL	1	1700	54	.03*	332	.20*
EBT	2	3400	8	.00	55	.03
EBR	0	0	26	.02	229	.13
WBL	1	1700	28	.02	27	.02
WBT	2	3400	45	.03*	17	.01*
WBR	0	0	141	.08	54	.03
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.62		.69

164 . Construction South at Barranca Parkway

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	31	.02*	342	.20*
NBT	1	1700	10	.01	16	.15
NBR	0	0	8		240	
SBL	1	1700	22	.01	23	.01
SBT	1	1700	58	.03*	21	.01*
SBR	1	1700	122	.07	81	.05
EBL	1	1700	143	.08	107	.06*
EBT	3	5100	646	.13*	1038	.20
EBR	1	1700	123	.07	23	.01
WBL	1	1700	204	.12*	69	.04
WBT	3	5100	727	.14	1061	.21*
WBR	d	1700	22	.01	25	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.35		.53

168 . Murphy Avenue at Alton Parkway

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	19	.01*	72	.04
NBT	1	1700	15	.03	121	.25*
NBR	0	0	29		303	
SBL	1	1700	14	.01	96	.06*
SBT	1	1700	26	.03*	43	.10
SBR	0	0	27		129	
EBL	1	1700	110	.06*	51	.03
EBT	3	5100	251	.05	1274	.25*
EBR	d	1700	39	.02	31	.02
WBL	1	1700	116	.07	54	.03*
WBT	3	5100	1098	.22*	523	.10
WBR	d	1700	117	.07	14	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.37		.64

170 . Union at Main Street

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	128	.04*	583	.17*
NBT	1	1700	3	.01	8	.05
NBR	0	0	11		74	
SBL	1	1700	12	.01	34	.02
SBT	1	1700	2	.00*	1	.00*
SBR	1	1700	31	.02	34	.02
EBL	2	3400	89	.03*	103	.03
EBT	3	5100	466	.09	1679	.33*
EBR	f		260		82	
WBL	2	3400	55	.02	29	.01*
WBT	3	5100	1254	.25*	536	.11
WBR	0	0	6		25	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .37 .56

171 . Veneto at Main Street

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	232	.07*	151	.04
NBT	1	1700	6	.02	23	.11*
NBR	0	0	23		157	
SBL	1	1700	41	.02	27	.02*
SBT	1	1700	11	.05*	7	.02
SBR	0	0	73		23	
EBL	1	1700	24	.01*	103	.06
EBT	3	5100	278	.06	1520	.32*
EBR	0	0	50		90	
WBL	2	3400	63	.02	37	.01*
WBT	3	5100	895	.18*	333	.07
WBR	0	0	17		32	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .36 .51

174 . Carlson Avenue at Michelson Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	191	.06*	52	.02*
NBT	2	3400	63	.02	51	.02
NBR	1	1700	68	.04	242	.14
SBL	2	3400	18	.01	135	.04
SBT	1	1700	14	.01*	87	.05*
SBR	f		134		356	
EBL	2	3400	403	.12*	406	.12
EBT	2	3400	432	.13	965	.28*
EBR	1	1700	48	.03	212	.12
WBL	1	1700	119	.07	178	.10*
WBT	2	3400	588	.17*	578	.17
WBR	f		70		137	
Right Turn Adjustment					NBR	.03*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .41 .53

175 . Carlson Avenue at Campus Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	131	.08*	131	.08*
SBT	0	0	2		0	
SBR	1	1700	217	.13	99	.06
EBL	1	1700	54	.03*	230	.14
EBT	1	1700	473	.28	984	.58*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1700	762	.45*	589	.35
WBR	d	1700	56	.03	109	.06
Right Turn Adjustment			SBR	.03*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .64 .71

180 . Harvard Avenue at Walnut Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	192	.06	284	.08
NBT	1	1700	61	.04*	65	.04*
NBR	d	1700	89	.05	213	.13
SBL	1	1700	146	.09*	114	.07*
SBT	1	1700	124	.07	49	.03
SBR	1	1700	121	.07	50	.03
EBL	1	1700	24	.01*	92	.05
EBT	2	3400	212	.06	637	.19*
EBR	1	1700	169	.10	256	.15
WBL	1	1700	127	.07	125	.07*
WBT	2	3400	789	.23*	425	.13
WBR	d	1700	120	.07	28	.02
Right Turn Adjustment					NBR	.04*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .42 .46

181 . Harvard Avenue at Irvine Center Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	203	.06*	211	.06
NBT	2	3400	163	.05	453	.13*
NBR	1	1700	67	.04	228	.13
SBL	1	1700	140	.08	72	.04*
SBT	2	3400	396	.12*	174	.05
SBR	d	1700	125	.07	49	.03
EBL	2	3400	54	.02*	150	.04*
EBT	3	5100	417	.08	922	.18
EBR	1	1700	157	.09	117	.07
WBL	2	3400	260	.08	83	.02
WBT	3	5100	1112	.23*	794	.18*
WBR	0	0	81		102	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .48 .44

182 . Harvard Avenue at Paseo Westpark/Moffett D

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	2	.00	0	.00
NBT	2	3400	325	.10	903	.27*
NBR	d	1700	20	.01	61	.04
SBL	1	1700	25	.01	28	.02*
SBT	2	3400	843	.25*	403	.12
SBR	1	1700	3	.00	3	.00
EBL	1	1700	3	.00	1	.00
EBT	1	1700	2	.00*	1	.00*
EBR	d	1700	0	.00	0	.00
WBL	1	1700	74	.04*	24	.01*
WBT	1	1700	0	.00	1	.00
WBR	d	1700	120	.07	65	.04
Right Turn Adjustment					WBR	.01*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .34 .36

183 . Harvard Avenue at Warner Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	61	.04*	138	.08
NBT	2	3400	215	.06	909	.27*
NBR	d	1700	26	.02	104	.06
SBL	1	1700	60	.04	52	.03*
SBT	2	3400	817	.24*	343	.10
SBR	d	1700	105	.06	41	.02
EBL	1	1700	66	.04*	133	.08*
EBT	2	3400	64	.02	286	.08
EBR	d	1700	52	.03	65	.04
WBL	1	1700	76	.04	33	.02
WBT	2	3400	283	.08*	145	.04*
WBR	d	1700	68	.04	47	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .47

184 . Harvard Avenue at Barranca Parkway

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	155	.09*	246	.14
NBT	2	3400	215	.06	961	.28*
NBR	1	1700	64	.04	121	.07
SBL	1	1700	121	.07	71	.04*
SBT	2	3400	748	.22*	315	.09
SBR	1	1700	169	.10	40	.02
EBL	2	3400	22	.01*	116	.03
EBT	3	5100	269	.05	822	.16*
EBR	1	1700	125	.07	196	.12
WBL	2	3400	179	.05	100	.03*
WBT	3	5100	809	.17*	545	.13
WBR	0	0	40		98	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .56

185 . Harvard Avenue at Alton Parkway

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	231	.14*	91	.05
NBT	2	3400	324	.10	1132	.33*
NBR	d	1700	70	.04	169	.10
SBL	1	1700	37	.02	87	.05*
SBT	2	3400	849	.25*	419	.12
SBR	1	1700	272	.16	66	.04
EBL	2	3400	47	.01*	286	.08
EBT	3	5100	133	.03	1008	.20*
EBR	1	1700	62	.04	210	.12
WBL	2	3400	180	.05	153	.05*
WBT	3	5100	900	.18*	337	.08
WBR	0	0	40		64	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .63 .68

186 . Harvard Avenue at Main Street

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	102	.03*	109	.03
NBT	2	3400	271	.08	1023	.30*
NBR	1	1700	68	.04	270	.16
SBL	2	3400	52	.02	28	.01*
SBT	2	3400	902	.27*	571	.17
SBR	1	1700	434	.26	124	.07
EBL	2	3400	116	.03	679	.20
EBT	3	5100	194	.06*	1232	.29*
EBR	0	0	90		252	
WBL	2	3400	337	.10*	113	.03*
WBT	3	5100	634	.13	172	.04
WBR	0	0	24		21	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .51 .68

187 . Harvard Avenue at Coronado

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	175	.05*	191	.06
NBT	2	3400	349	.11	1204	.37*
NBR	0	0	9		37	
SBL	1	1700	30	.02	65	.04*
SBT	2	3400	1111	.33*	762	.22
SBR	d	1700	169	.10	64	.04
EBL	2	3400	38	.01*	98	.03
EBT	1	1700	1	.00	70	.04*
EBR	d	1700	145	.09	250	.15
WBL	1	1700	36	.02	15	.01*
WBT	1	1700	11	.01*	11	.01
WBR	1	1700	81	.05	50	.03
Right Turn Adjustment			EBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .50 .51

188 . Harvard Avenue at Michelson Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	96	.06*	59	.03
NBT	2	3400	256	.08	854	.28*
NBR	0	0	21		105	
SBL	1	1700	119	.07	323	.19*
SBT	2	3400	710	.21*	533	.16
SBR	1	1700	425	.25	189	.11
EBL	2	3400	73	.02*	377	.11
EBT	2	3400	127	.04	904	.27*
EBR	f		34		118	
WBL	1	1700	129	.08	72	.04*
WBT	2	3400	692	.25*	248	.11
WBR	0	0	152		142	
Right Turn Adjustment			SBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .83

189 . Harvard Avenue at University Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	66	.04*	62	.04
NBT	2	3400	214	.06	506	.15*
NBR	d	1700	36	.02	173	.10
SBL	1	1700	15	.01	73	.04*
SBT	2	3400	391	.12*	434	.13
SBR	d	1700	434	.26	265	.16
EBL	1	1700	130	.08*	511	.30*
EBT	3	5100	466	.10	1527	.31
EBR	0	0	37		60	
WBL	1	1700	88	.05	90	.05
WBT	3	5100	1613	.33*	673	.14*
WBR	0	0	68		30	
Right Turn Adjustment			SBR	.08*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .70 .68

190 . University Drive at Campus Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	73	.04*	175	.10*
NBT	3	5100	487	.10	1362	.27
NBR	1	1700	303	.18	356	.21
SBL	1	1700	108	.06	69	.04
SBT	2	3400	1527	.45*	771	.23*
SBR	1	1700	178	.10	65	.04
EBL	1	1700	172	.10*	306	.18*
EBT	2	3400	364	.11	528	.16
EBR	d	1700	13	.01	96	.06
WBL	1	1700	30	.02	228	.13
WBT	2	3400	342	.10*	512	.15*
WBR	d	1700	213	.13	103	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .71

191 . Mesa Road at University Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	16	.01*	142	.08*
NBT	0	0	0		0	
NBR	1	1700	38	.02	182	.11
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	858	.25	1851	.54*
EBR	1	1700	98	.06	51	.03
WBL	1	1700	153	.09	107	.06*
WBT	2	3400	1564	.46*	929	.27
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .73

192 . California at University Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	35	.01*	256	.08*
NBT	0	0	0		0	
NBR	1	1700	80	.05	743	.44
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	948	.28*	1097	.32*
EBR	1	1700	308	.18	60	.04
WBL	1	1700	705	.41*	76	.04*
WBT	2	3400	910	.27	1029	.30
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.33*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .75 .82

193 . MacArthur Boulevard NB at University Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	54	.03*	20	.01*
NBT	0	0	0		0	
NBR	1	1700	221	.13	293	.17
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1038	.20*	825	.16*
EBR	d	1700	106	.06	78	.05
WBL	2	3400	268	.08*	632	.19*
WBT	2	3400	707	.21	655	.19
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.04*	NBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .40 .43

196 . Hearthstone Boulevard at Irvine Center Dri

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02*	18	.01*
NBT	2	3400	54	.02	42	.01
NBR	d	1700	255	.15	143	.08
SBL	1	1700	33	.02	23	.01
SBT	1	1700	41	.02*	38	.02*
SBR	d	1700	34	.02	26	.02
EBL	1	1700	26	.02*	96	.06
EBT	3	5100	577	.12	1143	.24*
EBR	0	0	49		69	
WBL	1	1700	128	.08	246	.14*
WBT	3	5100	1263	.25*	1136	.23
WBR	0	0	13		32	
Right Turn Adjustment			NBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .38 .46

198 . Paseo Westpark at Warner Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	70	.04*	60	.04
NBT	1	1700	88	.05	277	.16*
NBR	d	1700	29	.02	37	.02
SBL	1	1700	55	.03	55	.03*
SBT	1	1700	269	.16*	104	.06
SBR	d	1700	55	.03	32	.02
EBL	1	1700	66	.04*	72	.04
EBT	2	3400	147	.04	258	.08*
EBR	d	1700	28	.02	68	.04
WBL	1	1700	39	.02	26	.02*
WBT	2	3400	252	.07*	134	.04
WBR	d	1700	89	.05	50	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .36 .34

199 . Paseo Westpark at Barranca Parkway

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	83	.02*	144	.04
NBT	1	1700	78	.05	289	.17*
NBR	1	1700	124	.07	190	.11
SBL	2	3400	114	.03	63	.02*
SBT	1	1700	240	.14*	122	.07
SBR	d	1700	99	.06	48	.03
EBL	1	1700	19	.01*	82	.05
EBT	3	5100	417	.08	925	.18*
EBR	1	1700	56	.03	139	.08
WBL	1	1700	122	.07	104	.06*
WBT	3	5100	1029	.21*	631	.14
WBR	0	0	33		99	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .43 .48

200 . Paseo Westpark at Alton Parkway

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	87	.05	77	.05
NBT	1	1700	115	.12*	258	.20*
NBR	0	0	90		83	
SBL	1	1700	151	.09*	66	.04*
SBT	1	1700	130	.08	105	.06
SBR	1	1700	219	.13	107	.06
EBL	1	1700	18	.01*	75	.04
EBT	3	5100	352	.09	678	.14*
EBR	0	0	85		54	
WBL	1	1700	110	.06	102	.06*
WBT	3	5100	1038	.20*	507	.10
WBR	d	1700	100	.06	119	.07
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .47 .49

201 . Paseo Westpark at Main Street

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	181	.11	44	.03
NBT	1	1700	169	.19*	275	.20*
NBR	0	0	148		61	
SBL	1	1700	133	.08*	40	.02*
SBT	1	1700	208	.12	125	.07
SBR	1	1700	110	.06	57	.03
EBL	1	1700	12	.01*	41	.02
EBT	2	3400	324	.10	586	.17*
EBR	d	1700	140	.08	108	.06
WBL	1	1700	92	.05	32	.02*
WBT	2	3400	861	.25*	244	.07
WBR	d	1700	106	.06	56	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .46

221 . Culver Drive at Bryan Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	263	.08*	566	.17*
NBT	3	5100	623	.12	1252	.25
NBR	1	1700	180	.11	462	.27
SBL	2	3400	87	.03	101	.03
SBT	3	5100	1659	.33*	725	.14*
SBR	d	1700	195	.11	93	.05
EBL	2	3400	80	.02*	141	.04*
EBT	2	3400	124	.04	286	.08
EBR	1	1700	294	.17	341	.20
WBL	2	3400	456	.13	211	.06
WBT	2	3400	414	.17*	388	.14*
WBR	0	0	149		99	
Right Turn Adjustment			EBR	.05*		
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .70 .54

222 . Culver Drive at Trabuco Road

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	685	.13	1744	.34*
NBR	f		618		966	
SBL	1	1700	82	.05	100	.06*
SBT	3	5100	1604	.31*	973	.19
SBR	f		615		174	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	556	.16*	446	.13*
WBT	0	0	0		0	
WBR	2	3400	250	.07	399	.12
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .58

223 . Culver Drive at I-5 SB Ramps

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1006	.20	1731	.34*
NBR	f		238		296	
SBL	0	0	0		0	
SBT	3	5100	1732	.34*	1214	.24
SBR	f		312		224	
EBL	1.5		418	{.18}*	700	{.29}*
EBT	0	5100	0	.18	0	{.29}
EBR	1.5		501		903	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .68

224 . Culver Drive at Walnut Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	148	.04*	247	.07
NBT	3	5100	740	.15	1493	.29*
NBR	1	1700	262	.15	333	.20
SBL	2	3400	205	.06	348	.10*
SBT	3	5100	1760	.35*	1311	.26
SBR	d	1700	346	.20	193	.11
EBL	2	3400	242	.07	480	.14*
EBT	2	3400	389	.17*	439	.16
EBR	0	0	181		115	
WBL	2	3400	444	.13*	356	.10
WBT	2	3400	598	.18	480	.14*
WBR	d	1700	253	.15	226	.13
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .74 .72

225 . Culver Drive at Deerfield Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	20	.01*	80	.02
NBT	3	5100	869	.17	1673	.33*
NBR	1	1700	86	.05	131	.08
SBL	2	3400	165	.05	145	.04*
SBT	3	5100	2010	.39*	1431	.28
SBR	1	1700	149	.09	218	.13
EBL	1	1700	176	.10*	329	.19*
EBT	1	1700	154	.09	131	.08
EBR	d	1700	93	.05	125	.07
WBL	1	1700	174	.10	71	.04
WBT	1	1700	110	.19*	60	.10*
WBR	0	0	215		105	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .71

226 . Culver Drive at Irvine Center Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	220	.06*	242	.07
NBT	4	6800	649	.10	1437	.21*
NBR	f		133		364	
SBL	2	3400	150	.04	262	.08*
SBT	4	6800	1815	.27*	1269	.19
SBR	1	1700	244	.14	139	.08
EBL	2	3400	148	.04*	216	.06
EBT	3	5100	470	.09	788	.15*
EBR	f		160		138	
WBL	2	3400	374	.11	224	.07*
WBT	3	5100	915	.18*	756	.15
WBR	f		108		169	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .56

227 . Culver Drive at Warner Avenue

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	50	.03*	92	.05
NBT	3	5100	888	.17	1827	.36*
NBR	1	1700	61	.04	177	.10
SBL	1	1700	117	.07	137	.08*
SBT	3	5100	2157	.42*	1329	.26
SBR	d	1700	112	.07	143	.08
EBL	1	1700	149	.09	150	.09*
EBT	2	3400	143	.04*	151	.04
EBR	d	1700	97	.06	85	.05
WBL	1	1700	203	.12*	67	.04
WBT	2	3400	212	.06	62	.02*
WBR	d	1700	201	.12	121	.07
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .60

228 . Culver Drive at Barranca Parkway

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	84	.02*	156	.05
NBT	3	5100	538	.11	1577	.31*
NBR	1	1700	268	.16	311	.18
SBL	2	3400	346	.10	283	.08*
SBT	3	5100	1862	.37*	1101	.22
SBR	f		238		158	
EBL	2	3400	376	.11	261	.08
EBT	2	3400	746	.22*	585	.17*
EBR	1	1700	158	.09	326	.19
WBL	2	3400	334	.10*	191	.06*
WBT	2	3400	636	.19	488	.14
WBR	d	1700	139	.08	273	.16
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .67

229 . Culver Drive at Alton Parkway

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	112	.03*	236	.07
NBT	3	5100	736	.14	1757	.34*
NBR	1	1700	202	.12	319	.19
SBL	2	3400	112	.03	162	.05*
SBT	3	5100	1835	.36*	942	.18
SBR	f		246		173	
EBL	2	3400	84	.02*	235	.07
EBT	2	3400	355	.10	710	.21*
EBR	1	1700	137	.08	244	.14
WBL	2	3400	392	.12	272	.08*
WBT	2	3400	826	.24*	543	.16
WBR	1	1700	149	.09	183	.11
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.70		.73

230 . Culver Drive at Main Street

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	161	.05*	118	.03
NBT	3	5100	863	.17	1856	.36*
NBR	1	1700	158	.09	530	.31
SBL	2	3400	45	.01	164	.05*
SBT	3	5100	1937	.38*	1303	.26
SBR	f		401		111	
EBL	2	3400	133	.04	441	.13
EBT	2	3400	124	.04*	410	.12*
EBR	f		133		155	
WBL	2	3400	579	.17*	177	.05*
WBT	2	3400	317	.09	78	.02
WBR	1	1700	76	.04	68	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.69		.63

231 . Culver Drive at San Leandro

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	127	.07*	148	.09
NBT	3	5100	1121	.22	2398	.47*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2554	.50*	1600	.31
SBR	d	1700	123	.07	47	.03
EBL	1	1700	64	.04*	41	.02*
EBT	0	0	0		0	
EBR	1	1700	228	.13	46	.03
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.04*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.70		.54

232 . Culver Drive at I-405 NB Ramps

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	659	.13	1806	.35*
NBR	f		555		399	
SBL	0	0	0		0	
SBT	3	5100	1014	.20*	968	.19
SBR	f		926		656	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	654	.19*	469	.14*
WBT	0	0	0		0	
WBR	1	1700	438	.26	770	.45
Right Turn Adjustment			WBR	.02*	WBR	.31*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.46		.85

233 . Culver Drive at I-405 SB Ramps

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	890	.17	1393	.27*
NBR	f		197		514	
SBL	0	0	0		0	
SBT	3	5100	1378	.27*	1059	.21
SBR	f		251		295	
EBL	1.5		306	{.16}*	849	{.25}*
EBT	0	5100	0	.16	0	{.25}
EBR	1.5		526		526	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .48 .57

234 . Culver Drive at Michaelson Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	96	.03*	239	.07
NBT	3	5100	800	.16	1465	.30*
NBR	0	0	10		70	
SBL	2	3400	171	.05	570	.17*
SBT	3	5100	1488	.29*	733	.14
SBR	1	1700	235	.14	250	.15
EBL	2	3400	181	.05	293	.09
EBT	1	1700	103	.06*	178	.10*
EBR	1	1700	154	.09	177	.10
WBL	1	1700	88	.05*	170	.10*
WBT	2	3400	94	.03	139	.04
WBR	1	1700	203	.12	316	.19
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .49 .72

235 . Culver Drive at University Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	6	.00	51	.03
NBT	3	5100	1260	.25	1403	.28*
NBR	d	1700	200	.12	805	.47
SBL	1	1700	17	.01	27	.02*
SBT	3	5100	1147	.27*	1029	.25
SBR	0	0	252		254	
EBL	2	3400	43	.01	249	.07
EBT	3	5100	310	.06*	700	.14*
EBR	0	0	13		16	
WBL	2	3400	437	.13*	490	.14*
WBT	3	5100	711	.14	394	.08
WBR	0	0	21		36	
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .51 .71

337 . Von Karman at Quartz

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	431	.25*	206	.12*
NBT	2	3400	738	.22	1016	.30
NBR	1	1700	179	.11	60	.04
SBL	1	1700	152	.09	74	.04
SBT	2	3400	724	.21*	1001	.29*
SBR	d	1700	232	.14	94	.06
EBL	2	3400	37	.01*	184	.05*
EBT	1	1700	6	.00	7	.00
EBR	1	1700	62	.04	447	.26
WBL	1	1700	33	.02	60	.04
WBT	1	1700	21	.01*	13	.01*
WBR	f		48		160	
Right Turn Adjustment					EBR	.15*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .67

439 . Bixby at Michelson Drive

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	12	.01*	31	.02*
NBT	1	1700	3	.00	2	.01
NBR	0	0	5		21	
SBL	2	3400	10	.00	69	.02
SBT	1	1700	5	.02*	3	.09*
SBR	0	0	25		151	
EBL	1	1700	123	.07*	63	.04*
EBT	2	3400	271	.09	535	.17
EBR	0	0	38		34	
WBL	1	1700	34	.02	61	.04
WBT	2	3400	245	.07*	659	.19*
WBR	1	1700	54	.03	18	.01
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .22 .39

440 . Siglo at Main Street

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	14	.00	175	.05*
SBT	0	0	0		0	
SBR	1	1700	11	.01	47	.03
EBL	2	3400	22	.01*	36	.01
EBT	3	5100	435	.09	1995	.39*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5100	1571	.31*	857	.17
WBR	1	1700	148	.09	19	.01
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .37 .49

472 . Obsidian at Michelson

2008 NO PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	4		5	
NBT	1	1700	0	.01*	0	.01*
NBR	0	0	13		8	
SBL	0	0	9	{.01}*	119	{.07}*
SBT	1	1700	0	.01	0	.07
SBR	f		19		86	
EBL	1	1700	102	.06*	50	.03
EBT	2	3400	242	.07	574	.17*
EBR	0	0	10		6	
WBL	1	1700	12	.01	7	.00
WBT	2	3400	944	.28*	492	.14
WBR	f		149		52	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .41 .30

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\NoProj\EXE-193\ICU\Y08NP-NPB01-102809

61 . Airport Way at Campus Drive

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	2	3200	245	.08	379	.12
EBL	1	1600	218	.14*	295	.18*
EBT	3	4800	1091	.23	707	.15
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	453	.11*	1340	.32*
WBR	0	0	68		175	
Right Turn Adjustment			SBR	.08*	SBR	.12*
TOTAL CAPACITY UTILIZATION				.33		.62

62 . Campus Drive at Bristol Street NB

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	633	.20	811	.25*
NBT	3	4800	1873	.39*	530	.11
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6400	247	.04	845	.13*
SBR	2	3200	241	.08	913	.29
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	203	.13	284	.18
WBT	4	6400	957	.19*	1975	.32*
WBR	0	0	230		77	
Right Turn Adjustment					SBR	.16*
TOTAL CAPACITY UTILIZATION				.58		.86

63 . Campus Drive at Bristol Street SB

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	5	8000	1240	.18*	816	.13*
NBR	0	0	184		246	.15
SBL	1	1600	152	.10*	210	.13*
SBT	3	4800	297	.06	951	.20
SBR	0	0	0		0	
EBL	1.5		1272	{.44}*	426	{.21}*
EBT	2.5	6400	1570	.44	914	.21
EBR	2	3200	454	.14	506	.16
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.02*
TOTAL CAPACITY UTILIZATION				.72		.49

64 . Birch Street at Bristol NB

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	133	.04	167	.05*
NBT	2	3200	1069	.33*	355	.11
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	1.5	6400	149	.05	580	.25*
SBR	2.5		116	.04	1007	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		432		510	
WBT	3.5	8000	1191	.25*	1304	.25*
WBR	0		408	.26	148	
Right Turn Adjustment			WBR	.01*		
TOTAL CAPACITY UTILIZATION				.59		.55

65 . Birch Street at Bristol SB

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2.5	6400	347	.09*	300	.09
NBR	1.5		251		313	.10
SBL	2	3200	200	.06*	343	.11
SBT	2	3200	308	.10	755	.24*
SBR	0	0	0		0	
EBL	1.5		637	{.21}*	178	
EBT	3	8000	828	.21	1101	.17*
EBR	0.5		191		118	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .36 .41

84 . MacArthur Boulevard at Campus Drive

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	56	.04	106	.07
NBT	4	6400	951	.15*	988	.15*
NBR	1	1600	90	.06	57	.04
SBL	1	1600	255	.16*	158	.10*
SBT	4	6400	1025	.16	983	.15
SBR	1	1600	243	.15	699	.44
EBL	2	3200	371	.12*	321	.10*
EBT	3	4800	667	.14	434	.09
EBR	d	1600	93	.06	83	.05
WBL	2	3200	62	.02	100	.03
WBT	3	4800	280	.06*	992	.21*
WBR	f		109		151	
Right Turn Adjustment					SBR	.26*

TOTAL CAPACITY UTILIZATION .49 .82

85 . MacArthur Bloulevard at Birch

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	47	.03	113	.07*
NBT	3	4800	1741	.36*	1183	.25
NBR	f		104		22	
SBL	1	1600	146	.09*	69	.04
SBT	4	6400	771	.15	2067	.35*
SBR	0	0	177		170	
EBL	1.5		123	.08	294	{.11}*
EBT	1.5	4800	372	.13*	207	.11
EBR	0		59		24	
WBL	1	1600	21	.01*	103	.06
WBT	2	3200	164	.05	694	.22*
WBR	f		47		140	

TOTAL CAPACITY UTILIZATION .59 .75

105 . Von Karman Avenue at Campus Drive

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	17	.01	72	.05*
NBT	2	3200	681	.21*	506	.16
NBR	f		57		127	
SBL	1	1600	41	.03*	176	.11
SBT	2	3200	445	.17	935	.37*
SBR	0	0	85		262	
EBL	1	1600	250	.16*	198	.12*
EBT	2	3200	402	.13	451	.14
EBR	f		47		53	
WBL	1	1600	84	.05	103	.06
WBT	2	3200	313	.12*	703	.24*
WBR	0	0	76		71	

TOTAL CAPACITY UTILIZATION .52 .78

106 . Von Karman Avenue at Birch Street

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	26	.02	68	.04*
NBT	2	3200	539	.19*	477	.17
NBR	0	0	57		69	
SBL	1	1600	59	.04*	33	.02
SBT	2	3200	307	.15	606	.25*
SBR	0	0	165		207	
EBL	1	1600	88	.06*	122	.08*
EBT	2	3200	206	.08	168	.06
EBR	0	0	44		28	
WBL	1	1600	53	.03	22	.01
WBT	2	3200	172	.06*	288	.11*
WBR	0	0	16		52	

TOTAL CAPACITY UTILIZATION .35 .48

107 . Von Karman Avenue at MacArthur Boulevard

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	30	.02*	135	.08
NBT	2	3200	99	.03	192	.06*
NBR	f		25		180	
SBL	2	3200	90	.03	664	.21*
SBT	1	1600	151	.09*	104	.07
SBR	f		21		57	
EBL	1	1600	58	.04*	41	.03
EBT	3	4800	329	.07	811	.17*
EBR	f		164		51	
WBL	1	1600	96	.06	43	.03*
WBT	3	4800	904	.19*	583	.12
WBR	f		703		125	

TOTAL CAPACITY UTILIZATION .34 .47

121 . Teller Avenue at Campus Drive

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	5	.00	31	.02*
NBT	1	1600	24	.02	44	.03
NBR	1	1600	16	.01	68	.04
SBL	1	1600	7	.00	97	.06
SBT	1	1600	33	.03*	63	.09*
SBR	0	0	22		80	
EBL	1	1600	45	.03*	22	.01
EBT	2	3200	268	.08	748	.23*
EBR	f		28		16	
WBL	1	1600	58	.04	36	.02*
WBT	2	3200	563	.21*	342	.12
WBR	0	0	123		31	

TOTAL CAPACITY UTILIZATION .27 .36

147 . Jamboree Road at Campus Drive

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	173	.05*	79	.02
NBT	4	6400	1235	.20	1761	.33*
NBR	0	0	56		360	
SBL	2	3200	328	.10	319	.10*
SBT	3	4800	1669	.39*	1541	.35
SBR	0	0	181		137	
EBL	2	3200	97	.03	390	.12*
EBT	2	3200	175	.05*	484	.15
EBR	f		22		231	
WBL	2	3200	394	.12*	134	.04
WBT	2	3200	430	.13	276	.09*
WBR	1	1600	176	.11	246	.15
Right Turn Adjustment					WBR	.06*

TOTAL CAPACITY UTILIZATION .61 .70

148 . Jamboree Road at Birch Street

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	129	.08*	120	.08*
NBT	3	4800	1359	.28	1709	.36
NBR	0	0	1		1	
SBL	1	1600	5	.00	1	.00
SBT	3	4800	1665	.35*	1702	.35*
SBR	f		418		151	
EBL	1.5		122	{.04}*	333	{.10}*
EBT	0.5	3200	2	.04	0	.10
EBR	f		24		128	
WBL	0	0	1		1	
WBT	1	1600	2	.00*	1	.00*
WBR	0	0	2		2	

TOTAL CAPACITY UTILIZATION .47 .53

149 . Jamboree Road at Fairchild Road

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	8	.01	9	.01
NBT	3	4800	1591	.34*	1676	.35*
NBR	0	0	37		19	
SBL	2	3200	316	.10*	303	.09*
SBT	4	6400	1550	.24	1790	.28
SBR	d	1600	9	.01	2	.00
EBL	1	1600	1	.00	16	.01
EBT	1	1600	0	.00	5	.01*
EBR	0	0	1		18	
WBL	1	1600	6	.00	14	.01*
WBT	1	1600	2	.00*	6	.00
WBR	1	1600	299	.19	291	.18
Right Turn Adjustment			WBR	.19*	WBR	.17*

TOTAL CAPACITY UTILIZATION .63 .63

150 . Jamboree Road at MacArthur Boulevard

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	493	.15*	212	.07
NBT	3	4800	992	.21	1016	.21*
NBR	1	1600	233	.15	48	.03
SBL	2	3200	364	.11	538	.17*
SBT	3	4800	910	.19*	1146	.24
SBR	1	1600	194	.12	103	.06
EBL	2	3200	90	.03*	193	.06
EBT	3	4800	332	.07	1192	.25*
EBR	f		123		281	
WBL	2	3200	182	.06	283	.09*
WBT	3	4800	1577	.33*	582	.12
WBR	1	1600	540	.34	388	.24
Right Turn Adjustment			WBR	.01*		

TOTAL CAPACITY UTILIZATION .71 .72

151 . Jamboree Road at Bristol Street NB

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	859	.27	741	.23
NBT	1.5	4800	1554	.49*	2051	.64*
NBR	1.5		0		0	
SBL	0	0	0		0	
SBT	2.5	6400	559	.15	1156	.28
SBR	1.5		370		648	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .49 .64

153 . Jamboree Road at Bristol Street SB

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	5	8000	1955	.25*	1878	.25*
NBR	0	0	53		92	
SBL	0	0	0		0	
SBT	3	4800	620	.13	1079	.22
SBR	0	0	0		0	
EBL	1.5		987	.31*	1034	{.39}*
EBT	1.5	4800	342	.21	848	.39
EBR	2	3200	1123	.35	1153	.36
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.04*		

TOTAL CAPACITY UTILIZATION .60 .64

154 . Jamboree Road at Eastbluff Drive

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	71	.04	38	.02*
NBT	3	4800	1457	.30*	1386	.29
NBR	1	1600	190	.12	254	.16
SBL	2	3200	61	.02*	155	.05
SBT	3	4800	1295	.27	1896	.40*
SBR	1	1600	313	.20	426	.27
EBL	1.5		393	{.17}*	223	{.11}*
EBT	0.5	3200	108	.17	102	.11
EBR	0		33		26	
WBL	1.5		295		216	
WBT	1.5	4800	158	.09*	129	.07*
WBR	f		165		93	

TOTAL CAPACITY UTILIZATION .58 .60

155 . Jamboree Road at Bison Avenue

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	1346	.28*	1669	.35
NBR	d	1600	201	.13	138	.09
SBL	2	3200	196	.06*	181	.06
SBT	3	4800	1601	.33	2003	.42*
SBR	1	1600	196	.12	118	.07
EBL	1	1600	116	.07*	67	.04
EBT	0	0	0		0	
EBR	1	1600	71	.04	35	.02
WBL	2	3200	144	.05	273	.09*
WBT	0	0	0		0	
WBR	2	3200	175	.05	191	.06
Right Turn Adjustment			Multi	.07*	Multi	.03*

TOTAL CAPACITY UTILIZATION .48 .54

156 . Jamboree Road at Ford Road

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	364	.11*	362	.11*
NBT	3	4800	1300	.29	1785	.42
NBR	0	0	98		208	
SBL	1	1600	61	.04	44	.03
SBT	3	4800	1541	.32*	2132	.44*
SBR	1	1600	167	.10	49	.03
EBL	1.5		232	{.10}*	66	.04
EBT	1.5	4800	239	.10	212	.07*
EBR	1	1600	271	.17	255	.16
WBL	1.5		131	.08	181	{.07}*
WBT	1.5	4800	358	.11*	157	.07
WBR	1	1600	33	.02	35	.02
Right Turn Adjustment			EBR	.04*	EBR	.09*

TOTAL CAPACITY UTILIZATION .68 .78

176 . Fairchild Avenue at MacArthur Boulevard

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	29	.02*	413	.26*
SBT	0	0	0		0	
SBR	1	1600	21	.01	179	.11
EBL	1	1600	273	.17*	35	.02
EBT	3	4800	671	.14	1638	.34*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	2290	.59*	1085	.25
WBR	0	0	552		93	

TOTAL CAPACITY UTILIZATION .78 .60

178 . MacArthur Boulevard at Bison Avenue

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	197	.06	192	.06*
NBT	4	6400	2466	.39*	2454	.38
NBR	1	1600	154	.10	183	.11
SBL	2	3200	76	.02*	224	.07
SBT	4	6400	2018	.32	2707	.42*
SBR	1	1600	263	.16	321	.20
EBL	2	3200	224	.07	192	.06
EBT	2	3200	218	.07*	191	.06*
EBR	f		162		214	
WBL	2	3200	383	.12*	363	.11*
WBT	2	3200	217	.07	266	.08
WBR	1	1600	94	.06	141	.09

TOTAL CAPACITY UTILIZATION .60 .65

179 . MacArthur Boulevard at Ford Road

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	107	.03	61	.02
NBT	4	6400	1918	.30*	2348	.37*
NBR	f		83		468	
SBL	2	3200	529	.17*	774	.24*
SBT	4	6400	1923	.30	2328	.36
SBR	f		13		49	
EBL	2	3200	39	.01	27	.01
EBT	2	3200	266	.08*	299	.09*
EBR	1	1600	121	.08	61	.04
WBL	2	3200	552	.17*	232	.07*
WBT	2	3200	323	.10	280	.09
WBR	f		900		480	

TOTAL CAPACITY UTILIZATION .72 .77

194 . MacArthur Boulevard SB at University Drive

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	35	.02*	65	.04*
NBT	0	0	0		0	
NBR	1	1600	249	.16	104	.07
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	946	.21*	962	.21*
EBR	0	0	64		41	
WBL	2	3200	104	.03*	259	.08*
WBT	3	4800	840	.18	723	.15
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.14*	NBR	.03*

TOTAL CAPACITY UTILIZATION .40 .36

195 . SR-73 SB Ramps at University Drive

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	607	.38*	529	.33*
SBT	0	0	0		0	
SBR	1	1600	73	.05	152	.10
EBL	0	0	0		0	
EBT	3	4800	413	.09	590	.12*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	505	.11*	513	.11
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .49 .45

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\NoProj\EXE-193\ICU\Y08NP-NPB02-102809

733 . Irvine at Mesa Drive

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	58	.04	49	.03*
NBT	2	3200	833	.26*	566	.18
NBR	d	1600	276	.17	158	.10
SBL	1	1600	13	.01*	11	.01
SBT	2	3200	451	.14	1253	.39*
SBR	d	1600	27	.02	173	.11
EBL	1	1600	97	.06	28	.02
EBT	1	1600	185	.16*	77	.12*
EBR	0	0	64		110	
WBL	1	1600	153	.10*	436	.27*
WBT	1	1600	20	.01	407	.25
WBR	1	1600	8	.01	24	.02

TOTAL CAPACITY UTILIZATION .53 .81

734 . Irvine at University/Del Mar

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	102	.06	118	.07*
NBT	2	3200	1139	.36*	687	.21
NBR	1	1600	1	.00	23	.01
SBL	1	1600	96	.06*	40	.03
SBT	2	3200	547	.17	1583	.49*
SBR	1	1600	49	.03	119	.07
EBL	1	1600	143	.09*	75	.05*
EBT	1	1600	46	.03	32	.02
EBR	1	1600	114	.07	133	.08
WBL	1	1600	17	.01	48	.03
WBT	1	1600	13	.01*	31	.02*
WBR	d	1600	20	.01	34	.02
Right Turn Adjustment					EBR	.04*

TOTAL CAPACITY UTILIZATION .52 .67

741 . Jamboree Road at San Joaquin

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	41	.03	67	.04
NBT	3	4800	1143	.24*	1598	.33*
NBR	f		129		135	
SBL	2	3200	665	.21*	443	.14*
SBT	3	4800	1227	.26	1855	.39
SBR	1	1600	37	.02	117	.07
EBL	1.5		258	.08*	162	.05
EBT	1.5	4800	33	.02	34	.02*
EBR	f		59		57	
WBL	1.5		128	.04	189	.06*
WBT	1.5	4800	12	.01*	39	.02
WBR	1	1600	42	.03	67	.04
Right Turn Adjustment			WBR	.02*	WBR	.01*

TOTAL CAPACITY UTILIZATION .56 .56

742 . MacArthur Boulevard at San Joaquin

2008 NO PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	133	.04*	111	.03
NBT	3	4800	1327	.28	1879	.39*
NBR	1	1600	192	.12	26	.02
SBL	2	3200	272	.09	498	.16*
SBT	3	4800	1761	.37*	1882	.39
SBR	f		487		248	
EBL	2	3200	449	.14*	551	.17*
EBT	3	4800	105	.03	348	.11
EBR	0	0	37		163	
WBL	1	1600	9	.01	47	.03
WBT	2	3200	322	.10*	306	.10*
WBR	f		419		525	

TOTAL CAPACITY UTILIZATION .65 .82

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\NoProj\EXE-193\ICU\Y08NP-SAN01-102809

4 . SR-55 SB Ramps at Edinger Avenue

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		449	{.15}*	321	{.11}*
NBT	0.5	3400	67	.15	62	.11
NBR	f		387		183	
SBL	1	1700	63	.04	128	.08
SBT	1	1700	33	.04*	94	.09*
SBR	0	0	34		53	
EBL	1	1700	41	.02	55	.03
EBT	2	3400	852	.25*	1069	.31*
EBR	f		234		261	
WBL	1	1700	326	.19*	282	.17*
WBT	2	3400	953	.30	706	.23
WBR	0	0	79		70	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .73

5 . Hotel Terrace Drive at Dyer Road

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		183	{.06}*	167	{.05}*
NBT	0.5	3400	14	.06	13	.05
NBR	2	3400	315	.09	83	.02
SBL	0.5		81		88	
SBT	1.5	3400	174	.08*	462	.16*
SBR	1	1700	36	.02	130	.08
EBL	1	1700	64	.04	129	.08
EBT	3	5100	908	.18*	818	.16*
EBR	1	1700	336	.20	143	.08
WBL	2	3400	451	.13*	572	.17*
WBT	3	5100	720	.14	836	.16
WBR	1	1700	178	.10	49	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .50 .59

6 . Grand Avenue at Dyer Road

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	503	.15*	706	.21*
SBT	0	0	0		0	
SBR	1	1700	403	.24	312	.18
EBL	1	1700	171	.10*	314	.18*
EBT	3	5100	1133	.22	770	.15
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	958	.28*	1198	.35*
WBR	f		641		408	
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .79

7 . SR-55 NB Ramps at Dyer Road

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		815	{.29}*	219	.06*
NBT	0	5100	0	.29	0	
NBR	1.5		679		66	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1856	.36*	935	.18
EBR	f		551		1023	
WBL	0	0	0		0	
WBT	2.5	5100	820	.22	1488	.44*
WBR	0.5		325		1205	.71
Right Turn Adjustment					WBR	.22*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .70 .77

8 . SR-55 SB Ramps at MacArthur Boulevard

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	926	.27*	323	.10*
SBT	0	0	0		0	
SBR	2	3400	905	.27	739	.22
EBL	0	0	0		0	
EBT	2	3400	1208	.36*	1116	.33
EBR	f		695		947	
WBL	0	0	0		0	
WBT	3	5100	1140	.22	1662	.33*
WBR	f		135		658	
Right Turn Adjustment					SBR	.12*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .60

9 . SR-55 NB Ramps at MacArthur Boulevard

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	987	.29*	656	.19*
NBT	0	0	0		0	
NBR	f		694		240	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	1329	.39*	772	.23
EBR	f		606		740	
WBL	0	0	0		0	
WBT	3	5100	514	.10	1575	.31*
WBR	f		246		1148	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .73 .55

28 . Pullman Street at Warner Avenue

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		52	{.03}*	144	
NBT	0.5	1700	22	.04	4	.09*
NBR	1	1700	65	.04	90	.05
SBL	0	0	7		54	{.03}*
SBT	2	3400	8	.01*	34	.04
SBR	0	0	2		66	.04
EBL	1	1700	45	.03	9	.01*
EBT	3	5100	727	.18*	584	.12
EBR	0	0	193		53	
WBL	1	1700	51	.03*	63	.04
WBT	3	5100	389	.08	956	.19*
WBR	0	0	34		7	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .30 .37

29 . Pullman Street at Barranca Parkway

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	122	.04*	644	.19*
NBT	1	1700	21	.03	16	.05
NBR	0	0	31		73	
SBL	1	1700	40	.02	28	.02
SBT	0.5	3400	26	{.02}*	10	{.08}*
SBR	1.5		97		377	
EBL	1	1700	264	.16	158	.09*
EBT	3	5100	1075	.29*	778	.17
EBR	0	0	419		77	
WBL	1	1700	47	.03*	52	.03
WBT	3	5100	748	.15	1533	.31*
WBR	0	0	20		24	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .43 .72

543 . Bristol at Segerstrom

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	55	.03*	154	.09
NBT	3	5100	668	.13	1239	.24*
NBR	d	1700	162	.10	262	.15
SBL	1	1700	202	.12	152	.09*
SBT	3	5100	1101	.23*	909	.20
SBR	0	0	76		91	
EBL	1	1700	174	.10	207	.12*
EBT	2	3400	700	.22*	593	.23
EBR	0	0	63		201	
WBL	1	1700	148	.09*	190	.11
WBT	2	3400	421	.14	728	.24*
WBR	0	0	71		102	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.62		.74

544 . Bristol at MacArthur Boulevard

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	89	.03*	427	.13*
NBT	3	5100	521	.10	1312	.26
NBR	1	1700	109	.06	317	.19
SBL	2	3400	216	.06	252	.07
SBT	3	5100	1072	.23*	938	.21*
SBR	0	0	120		158	
EBL	2	3400	172	.05	327	.10*
EBT	3	5100	1223	.24*	763	.15
EBR	1	1700	143	.08	155	.09
WBL	2	3400	162	.05*	359	.11
WBT	3	5100	1000	.20	1440	.28*
WBR	1	1700	123	.07	248	.15
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.60		.77

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\NoProj\EXE-193\ICU\Y08NP-NPB02-102809

719 . Flower at Segerstrom

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	88	.05	78	.05*
NBT	2	3400	483	.16*	331	.13
NBR	0	0	77		106	
SBL	1	1700	77	.05*	141	.08
SBT	2	3400	341	.12	683	.22*
SBR	0	0	57		72	
EBL	1	1700	93	.05	92	.05*
EBT	2	3400	781	.31*	531	.19
EBR	0	0	262		108	
WBL	1	1700	65	.04*	43	.03
WBT	2	3400	476	.15	829	.27*
WBR	0	0	40		74	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .64

720 . Flower at MacArthur Boulevard

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	21	.01*	45	.03
NBT	2	3400	120	.05	516	.17*
NBR	0	0	60		70	
SBL	1	1700	127	.07	74	.04*
SBT	2	3400	265	.14*	152	.08
SBR	0	0	211		108	
EBL	1	1700	181	.11	159	.09*
EBT	3	5100	1271	.26*	986	.20
EBR	0	0	40		47	
WBL	1	1700	45	.03*	53	.03
WBT	3	5100	692	.15	1891	.40*
WBR	0	0	58		134	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .49 .75

723 . Main Street at Segerstrom

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	57	.03*	140	.08
NBT	2	3400	393	.12	979	.29*
NBR	1	1700	166	.10	321	.19
SBL	1	1700	194	.11	91	.05*
SBT	3	5100	921	.21*	550	.14
SBR	0	0	142		149	
EBL	1	1700	164	.10	121	.07*
EBT	2	3400	825	.24*	432	.13
EBR	1	1700	151	.09	56	.03
WBL	1	1700	130	.08*	143	.08
WBT	2	3400	612	.18	736	.22*
WBR	1	1700	91	.05	131	.08
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .68

724 . Main Street at Alton Avenue

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	12	.01*	28	.02
NBT	3	5100	630	.13	1367	.28*
NBR	0	0	42		37	
SBL	1	1700	81	.05	58	.03*
SBT	3	5100	1086	.21*	628	.13
SBR	0	0	7		29	
EBL	0	0	8		10	{.01}*
EBT	0	0	2		2	
EBR	0	0	25		16	
WBL	0.5		35		58	
WBT	0.5	1700	2	.02*	1	.03*
WBR	1	1700	35	.02	73	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .29 .40

725 . Main Street and MacArthur (w/o SR-55)

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	44	.01	340	.10
NBT	3	5100	266	.05*	636	.12*
NBR	1	1700	191	.11	381	.22
SBL	2	3400	378	.11*	221	.07*
SBT	3	5100	599	.12	413	.08
SBR	1	1700	135	.08	295	.17
EBL	2	3400	266	.08	280	.08*
EBT	3	5100	1535	.30*	646	.13
EBR	1	1700	169	.10	55	.03
WBL	2	3400	293	.09*	223	.07
WBT	3	5100	717	.14	1319	.26*
WBR	1	1700	267	.16	397	.23
Right Turn Adjustment					SBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .60

727 . Halladay Street at Dyer Road

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	4	.00	27	.02
NBT	1	1700	10	.05*	79	.14*
NBR	0	0	68		167	
SBL	1	1700	237	.14*	153	.09*
SBT	1	1700	33	.06	30	.05
SBR	0	0	63		53	
EBL	1	1700	71	.04	134	.08*
EBT	3	5100	1059	.21*	944	.19
EBR	0	0	7		5	
WBL	1	1700	128	.08*	59	.03
WBT	3	5100	596	.14	990	.22*
WBR	0	0	143		112	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .58

728 . Halladay Street East at Alton Parkway

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0.5		31		43	
SBT	0	1700	0	.11*	0	.06*
SBR	0.5		153		58	
EBL	1	1700	51	.03*	214	.13*
EBT	1	1700	52	.03	37	.02
EBR	0	0	0		0	
WBL	1	1700	0	.00	0	.00
WBT	1	1700	19	.01*	54	.03*
WBR	1	1700	33	.02	58	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .20 .27

729 . Halladay Street West at Alton Parkway

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		1		24	
NBT	0.5	1700	0	.02*	0	.10*
NBR	0		25		146	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	1	1700	79	.06*	99	.06*
EBR	0	0	28		4	
WBL	0.5		105	{.06}*	28	{.02}*
WBT	0.5	1700	66	.10	93	.07
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .19 .23

730 . Grand Avenue at Warner Avenue

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	178	.10	269	.16*
NBT	3	5100	556	.15*	669	.15
NBR	0	0	191		92	
SBL	1	1700	157	.09*	125	.07
SBT	3	5100	527	.14	555	.16*
SBR	0	0	209		279	.16
EBL	2	3400	329	.10*	365	.11*
EBT	3	5100	668	.13	349	.07
EBR	1	1700	218	.13	159	.09
WBL	2	3400	75	.02	151	.04
WBT	2	3400	243	.07*	717	.21*
WBR	1	1700	76	.04	247	.15
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.46		.69

731 . Grand Avenue at SR-55 SB Ramps

2008 NO PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	805	.24*	725	.21*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	566	.11	713	.14
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	352	.21*	328	.19*
WBT	0	0	0		0	
WBR	1	1700	363	.21	245	.14
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.50		.45

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\NoProj\EXE-193\ICU\Y08NP-TUS01-102809

3 . Newport Avenue at Edinger Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	346	.10*	211	.06*
NBT	0	0	0		0	
NBR	1	1700	31	.02	15	.01
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	627	.12*	900	.18*
EBR	1	1700	697	.41	663	.39
WBL	1	1700	174	.10*	130	.08*
WBT	3	5100	1082	.21	980	.19
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.19*	EBR	.15*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .56 .52

14 . Walnut Avenue to McFadden Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	290	.09*	480	.14*
NBT	0	0	0		0	
NBR	1	1700	7	.00	51	.03
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	384	.19	582	.25*
EBR	0	0	246		282	
WBL	1	1700	16	.01	19	.01*
WBT	2	3400	811	.24*	465	.14
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .38 .45

18 . Newport Avenue at Bryan Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	57	.03*	109	.06
NBT	2	3400	492	.14	977	.29*
NBR	d	1700	11	.01	25	.01
SBL	1	1700	64	.04	125	.07*
SBT	2	3400	1372	.40*	974	.29
SBR	d	1700	55	.03	36	.02
EBL	1	1700	18	.01*	49	.03*
EBT	1	1700	26	.02	66	.04
EBR	1	1700	61	.04	166	.10
WBL	1	1700	21	.01	43	.03
WBT	1	1700	62	.04*	82	.05*
WBR	1	1700	229	.13	393	.23
Right Turn Adjustment					WBR	.13*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .62

19 . Newport Avenue at Main Street

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	84	.05	139	.08*
NBT	2	3400	355	.10*	936	.28
NBR	d	1700	40	.02	85	.05
SBL	1	1700	34	.02*	70	.04
SBT	2	3400	100	.03	879	.26*
SBR	1	1700	62	.04	131	.08
EBL	1	1700	38	.02	111	.07*
EBT	2	3400	82	.02*	223	.07
EBR	1	1700	103	.06	139	.08
WBL	1	1700	136	.08*	172	.10
WBT	2	3400	163	.05	429	.13*
WBR	1	1700	7	.00	26	.02
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .27 .59

20 . Newport Avenue at El Camino Real

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	189	.11*	182	.11
NBT	2	3400	585	.17	819	.24*
NBR	d	1700	132	.08	167	.10
SBL	1	1700	84	.05	188	.11*
SBT	3	5100	1240	.25*	823	.17
SBR	0	0	16		69	
EBL	1	1700	8	.00	37	.02
EBT	1	1700	94	.06*	261	.15*
EBR	1	1700	263	.15	203	.12
WBL	1	1700	164	.10*	197	.12*
WBT	2	3400	180	.07	337	.13
WBR	0	0	63		101	
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .67

21 . Newport Avenue at I-5 NB Ramps

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	220	.13*	309	.18*
NBT	2	3400	1014	.30	1514	.45
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	1343	.40*	1002	.29*
SBR	1	1700	411	.24	434	.26
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .52

22 . Newport Avenue at I-5 SB Ramps

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	860	.25*	1191	.35*
NBR	1	1700	63	.04	61	.04
SBL	1	1700	176	.10*	223	.13*
SBT	2	3400	1094	.32	861	.25
SBR	0	0	0		0	
EBL	1.5		369		415	
EBT	0.5	3400	77	.13*	54	.14*
EBR	1	1700	326	.19	531	.31
WBL	1	1700	29	.02*	67	.04*
WBT	0	0	0		0	
WBR	1	1700	110	.06	183	.11
Right Turn Adjustment			EBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .71

23 . Newport Avenue at McFadden Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	28	.02*	43	.03*
NBT	3	5100	527	.11	640	.13
NBR	0	0	11		15	
SBL	1	1700	18	.01	38	.02
SBT	3	5100	795	.23*	669	.20*
SBR	0	0	917	.54	416	.24
EBL	2	3400	338	.10*	526	.15*
EBT	0	0	1	.	9	
EBR	1	1700	37	.02	33	.02
WBL	0	0	0		0	
WBT	1	1700	0	.01*	0	.02*
WBR	0	0	19		28	
Right Turn Adjustment			SBR	.23*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .64 .45

24 . Newport Avenue at Walnut Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	24	.01	57	.03
NBT	2	3400	438	.13*	377	.11*
NBR	d	1700	96	.06	68	.04
SBL	1	1700	568	.33*	468	.28*
SBT	2	3400	288	.08	400	.12
SBR	d	1700	19	.01	43	.03
EBL	1	1700	34	.02*	19	.01*
EBT	2	3400	197	.07	242	.08
EBR	0	0	27		36	
WBL	1	1700	76	.04	112	.07
WBT	2	3400	260	.15*	429	.25*
WBR	0	0	322	.19	500	.29
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .70

25 . Newport Avenue at Sycamore Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	129	.08	41	.02
NBT	1	1700	95	.06*	63	.04*
NBR	d	1700	69	.04	26	.02
SBL	1	1700	213	.13*	235	.14*
SBT	1	1700	70	.04	139	.08
SBR	1	1700	103	.06	79	.05
EBL	1	1700	159	.09*	103	.06*
EBT	1	1700	65	.04	53	.05
EBR	0	0	11		24	
WBL	0.5		27		54	
WBT	1.5	3400	262	.12*	332	.16*
WBR	0		133		166	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .45

27 . Del Amo Avenue at Edinger Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		18	{.01}*	62	{.02}*
NBT	0.5	3400	4	.01	0	.02
NBR	1	1700	143	.08	75	.04
SBL	0	0	4		1	
SBT	1	1700	1	.00*	2	.00*
SBR	0	0	3		0	
EBL	1	1700	13	.01*	7	.00
EBT	3	5100	612	.12	828	.16*
EBR	d	1700	32	.02	68	.04
WBL	2	3400	190	.06	181	.05*
WBT	3	5100	1246	.24*	1092	.21
WBR	d	1700	0	.00	0	.00
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .31 .28

35 . Red Hill Avenue at Bryan Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	113	.07*	175	.10
NBT	2	3400	393	.12	790	.23*
NBR	1	1700	139	.08	109	.06
SBL	1	1700	77	.05	117	.07*
SBT	2	3400	827	.24*	437	.13
SBR	1	1700	62	.04	44	.03
EBL	1	1700	39	.02*	36	.02*
EBT	2	3400	306	.11	421	.16
EBR	0	0	81		115	
WBL	1	1700	142	.08	108	.06
WBT	2	3400	523	.19*	589	.21*
WBR	0	0	129		128	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .58

36 . Red Hill Avenue at El Camino Real

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	280	.08*	374	.11
NBT	3	5100	629	.12	813	.16*
NBR	1	1700	167	.10	329	.19
SBL	1	1700	77	.05	260	.15*
SBT	3	5100	1292	.26*	581	.12
SBR	0	0	49		51	
EBL	1	1700	82	.05	29	.02
EBT	1	1700	212	.12*	918	.54*
EBR	1	1700	254	.15	144	.08
WBL	1	1700	298	.18*	349	.21*
WBT	1	1700	173	.13	904	.63
WBR	0	0	43		161	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 1.11

37 . Red Hill Avenue at Nisson Road

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	12	.01*	17	.01
NBT	4	6800	817	.12	1489	.22*
NBR	0	0	28		34	
SBL	1	1700	91	.05	138	.08*
SBT	3	5100	1429	.28*	740	.15
SBR	d	1700	71	.04	58	.03
EBL	1	1700	211	.12*	227	.13*
EBT	1	1700	52	.05	124	.09
EBR	0	0	35		26	
WBL	1	1700	34	.02	51	.03
WBT	1	1700	42	.14*	97	.16*
WBR	0	0	197		167	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .64

38 . Red Hill Avenue at Walnut Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	107	.06*	271	.16
NBT	3	5100	404	.11	1666	.37*
NBR	0	0	159		240	
SBL	1	1700	92	.05	149	.09*
SBT	2	3400	1325	.39*	510	.15
SBR	d	1700	91	.05	154	.09
EBL	1	1700	95	.06	135	.08*
EBT	2	3400	310	.17*	299	.11
EBR	0	0	280		87	
WBL	1	1700	276	.16*	223	.13
WBT	2	3400	336	.14	456	.17*
WBR	0	0	137		117	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .83 .76

39 . Red Hill Avenue at Sycamore Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	38	.02*	322	.19
NBT	3	5100	602	.13	1881	.39*
NBR	0	0	36		107	
SBL	1	1700	51	.03	112	.07*
SBT	2	3400	1691	.50*	670	.20
SBR	d	1700	59	.03	133	.08
EBL	1	1700	66	.04	56	.03
EBT	1	1700	23	.01*	26	.02*
EBR	1	1700	138	.08	101	.06
WBL	1	1700	116	.07*	49	.03*
WBT	1	1700	73	.04	25	.01
WBR	1	1700	80	.05	53	.03
Right Turn Adjustment			EBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .70 .56

40 . Red Hill Avenue at Edinger Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	81	.02*	181	.05
NBT	3	5100	308	.06	1752	.34*
NBR	d	1700	98	.06	364	.21
SBL	2	3400	136	.04	150	.04*
SBT	3	5100	1452	.28*	411	.08
SBR	1	1700	318	.19	191	.11
EBL	2	3400	152	.04*	300	.09*
EBT	3	5100	287	.06	550	.11
EBR	1	1700	150	.09	91	.05
WBL	2	3400	557	.16	137	.04
WBT	2	3400	1031	.30*	576	.17*
WBR	1	1700	138	.08	350	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR EBR

TOTAL CAPACITY UTILIZATION .69 .69

41 . Red Hill Avenue at Warner Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	311	.09*	432	.13
NBT	3	5100	327	.06	1686	.33*
NBR	0	0	0		0	
SBL	1	1700	0	.00	0	.00
SBT	3	5100	1488	.37*	459	.14
SBR	0	0	389		236	.14
EBL	2	3400	201	.06*	300	.09*
EBT	0	0	0		0	
EBR	1	1700	340	.20	277	.16
WBL	0	0	0		0	
WBT	1	1700	0	.00*	0	.00*
WBR	0	0	0		0	
Right Turn Adjustment		EBR	.07*			
Clearance Interval			.05*		.05*	

TOTAL CAPACITY UTILIZATION .64 .47

55 . Browning Avenue at Bryan Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	49	.03	43	.03
NBT	2	3400	330	.10*	529	.16*
NBR	d	1700	172	.10	40	.02
SBL	1	1700	64	.04*	48	.03*
SBT	2	3400	98	.03	110	.03
SBR	d	1700	46	.03	34	.02
EBL	1	1700	47	.03	42	.02
EBT	2	3400	512	.15*	993	.29*
EBR	d	1700	42	.02	69	.04
WBL	1	1700	53	.03*	36	.02*
WBT	2	3400	112	.03	77	.02
WBR	1	1700	101	.06	61	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .37 .55

56 . Browning Avenue at El Camino Real

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	111	.07*	33	.02*
SBT	0	0	0		0	
SBR	1	1700	149	.09	71	.04
EBL	0	0	158	{.09}*	101	{.06}*
EBT	2	3400	141	.09	261	.11
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1700	148	.09*	521	.31*
WBR	1	1700	21	.01	80	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .30 .44

58 . Browning Avenue at Walnut Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	140	.08*	81	.05*
SBT	0	0	0		0	
SBR	1	1700	131	.08	40	.02
EBL	1	1700	111	.07*	56	.03*
EBT	2	3400	615	.18	649	.19
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	570	.20*	913	.36*
WBR	0	0	113		313	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .40 .49

92 . Tustin Ranch Road at Bryan Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05*	428	.25
NBT	3	5100	479	.09	1668	.33*
NBR	1	1700	58	.03	115	.07
SBL	1	1700	103	.06	74	.04*
SBT	3	5100	1834	.36*	476	.09
SBR	1	1700	75	.04	141	.08
EBL	2	3400	44	.01	108	.03*
EBT	2	3400	243	.07*	582	.17
EBR	1	1700	221	.13	150	.09
WBL	2	3400	213	.06*	132	.04
WBT	2	3400	116	.03	726	.21*
WBR	d	1700	43	.03	135	.08
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR EBR

TOTAL CAPACITY UTILIZATION .60 .66

93 . Tustin Ranch Road at El Camino Real

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	100	.03*	471	.14
NBT	3	5100	433	.08	1919	.38*
NBR	d	1700	122	.07	278	.16
SBL	2	3400	61	.02	112	.03*
SBT	3	5100	2141	.42*	630	.12
SBR	d	1700	72	.04	45	.03
EBL	1	1700	100	.06	54	.03*
EBT	2	3400	118	.07*	205	.10
EBR	0	0	475	.28	132	
WBL	1	1700	230	.14*	223	.13
WBT	2	3400	101	.05	388	.20*
WBR	0	0	58		282	
Right Turn Adjustment			EBR	.19*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .90 .69

94 . Tustin Ranch Road at I-5 NB Ramps

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	309	.09*	621	.18*
NBT	3	5100	945	.19	1184	.23
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1828	.36*	698	.14*
SBR	f		62		496	
EBL	1.5		103	.03*	273	.08*
EBT	0	5100	0		0	
EBR	1.5		137	{.01}	199	{.00}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .45

95 . Tustin Ranch Road at I-5 SB Ramps

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	130	.04*	103	.03
NBT	3	5100	757	.15	1083	.21*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1429	.28*	623	.12
SBR	d	1700	539	.32	280	.16
EBL	1.5		881	{.30}*	750	.22*
EBT	0	5100	0	{.30}	0	
EBR	1.5		681		332	.20
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .48

96 . Tustin Ranch Road at Walnut Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		1257	.37*	339	
SBT	0	5100	0		0	{.11}*
SBR	1.5		539	.32	460	
EBL	1	1700	436	.26*	325	.19*
EBT	2	3400	554	.16	460	.14
EBR	d	1700	0	.00	0	.00
WBL	0	0	0		0	
WBT	2	3400	429	.13*	427	.13*
WBR	1	1700	590	.35	840	.49
Right Turn Adjustment					WBR	.28*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .81 .76

109 . Myford Road at Bryan Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	23	.01*	37	.02
NBT	2	3400	39	.01	130	.05*
NBR	0	0	11		43	
SBL	1	1700	108	.06	38	.02*
SBT	2	3400	120	.06*	56	.03
SBR	0	0	68		44	
EBL	1	1700	31	.02*	54	.03*
EBT	2	3400	323	.10	534	.16
EBR	d	1700	16	.01	37	.02
WBL	1	1700	80	.05	62	.04
WBT	2	3400	772	.23*	727	.21*
WBR	d	1700	44	.03	80	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .37 .36

110 . Myford Road at El Camino Real

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	11	.01	4	.00
NBT	2	3400	10	.01*	4	.00*
NBR	0	0	9		12	.01
SBL	1	1700	84	.05*	102	.06*
SBT	1	1700	2	.00	4	.00
SBR	1	1700	112	.07	68	.04
EBL	1	1700	17	.01*	78	.05*
EBT	2	3400	282	.09	540	.16
EBR	0	0	16		10	
WBL	1	1700	6	.00	20	.01
WBT	2	3400	281	.09*	668	.23*
WBR	0	0	20		106	
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .22 .39

111 . Franklin Avenue at Walnut Avenue

2008 NO PROJECT (TUSTIN ISEC)

			AM PK HOUR		PM PK HOUR	
	LANES	CAPACITY	VOL	V/C	VOL	V/C
NBL	1	1700	71	.04*	239	.14*
NBT	2	3400	11	.01	12	.01
NBR	0	0	22	.01	18	.01
SBL	1	1700	34	.02	80	.05
SBT	2	3400	9	.01*	9	.01*
SBR	0	0	82	.05	443	.26
EBL	1	1700	384	.23*	157	.09*
EBT	2	3400	950	.28	559	.16
EBR	d	1700	333	.20	79	.05
WBL	1	1700	66	.04	12	.01
WBT	2	3400	334	.10*	1476	.43*
WBR	d	1700	133	.08	72	.04
Right Turn Adjustment					SBR	.18*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.43		.90

453 . Redhill Avenue at Valencia Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	59	.03*	79	.05
NBT	3	5100	468	.10	2094	.42*
NBR	0	0	25		67	
SBL	1	1700	25	.01	29	.02*
SBT	3	5100	1947	.42*	590	.12
SBR	0	0	177		42	
EBL	1	1700	17	.01*	144	.08*
EBT	1	1700	4	.00	17	.01
EBR	1	1700	21	.01	71	.04
WBL	1	1700	55	.03	20	.01
WBT	1	1700	41	.04*	27	.05*
WBR	0	0	35		56	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .62

478 . Redhill Avenue at I-5 NB Ramps

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	424	.25*	437	.26*
NBT	3	5100	871	.17	1062	.21
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1301	.26*	738	.14*
SBR	1	1700	603	.35	300	.18
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		286		307	
WBT	0.5	3400	2	.08*	36	.10*
WBR	1	1700	247	.15	402	.24
Right Turn Adjustment			SBR	.09*	SBR	.04*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .73 .59

479 . Redhill Avenue at I-5 SB Ramps

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1055	.16*	1111	.16*
NBR	1	1700	591	.35	441	.26
SBL	1	1700	403	.24*	298	.18*
SBT	3	5100	1201	.24	746	.15
SBR	0	0	0		0	
EBL	0.5		226	{.13}*	386	{.23}*
EBT	0.5	1700	0	.13	0	.23
EBR	1	1700	457	.27	325	.19
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			Multi	.21*	NBR	.10*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .79 .72

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\NoProj\EXE-193\ICU\Y08NP-TUS02-102809

732 . Newport Avenue at SR-55 NB Ramps

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	53	.02*	454	.13*
NBT	3	5100	29	.01	168	.04
NBR	0	0	11		41	
SBL	1	1700	0	.00	11	.01
SBT	2	3400	190	.06*	36	.01*
SBR	1	1700	727	.43	766	.45
EBL	2	3400	354	.10*	114	.03*
EBT	1.5	3400	162	.08	24	.01
EBR	0.5		115		8	
WBL	1	1700	29	.02	18	.01
WBT	2	3400	124	.04*	314	.10*
WBR	0	0	3		12	
Right Turn Adjustment			SBR	.29*	SBR	.42*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .56 .74

739 . Newport Avenue at Mitchell Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	12	.01*	9	.01
NBT	2	3400	758	.22	940	.28*
NBR	d	1700	208	.12	168	.10
SBL	1	1700	114	.07	205	.12*
SBT	2	3400	1386	.41*	972	.29
SBR	d	1700	65	.04	139	.08
EBL	0.5		122	{.07}*	85	{.05}*
EBT	0.5	1700	72	.11	47	.08
EBR	1	1700	14	.01	14	.01
WBL	0.5		144		155	
WBT	0.5	1700	56	.12*	72	.13*
WBR	1	1700	87	.05	159	.09
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .63

740 . Redhill Avenue at Mitchell Avenue

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	34	.02	150	.09
NBT	2	3400	1572	.46*	1317	.39*
NBR	1	1700	93	.05	109	.06
SBL	1	1700	248	.15*	120	.07*
SBT	2	3400	1152	.34	788	.23
SBR	1	1700	156	.09	90	.05
EBL	0.5		41		122	
EBT	0.5	1700	33	.04*	99	.13*
EBR	1	1700	15	.01	51	.03
WBL	0.5		20	{.01}*	14	{.01}*
WBT	0.5	1700	20	.02	83	.06
WBR	1	1700	71	.04	84	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .71 .65

754 . Red Hill Avenue at Carnegie Avenue/A Street

2008 NO PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	106	.06*	23	.01
NBT	3	5100	542	.11	2098	.41*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1285	.27*	742	.15
SBR	0	0	117		10	
EBL	1	1700	7	.00	121	.07*
EBT	1	1700	0	.00	0	.03
EBR	0	0	8		58	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .38 .53

Appendix B-2 Existing With Project ICU Worksheets

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\wProj\EXE-193\ICU\Y08WP-COM01-102809

10 . SR-55 Frontage Road SB Ramps at Paularino

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	459		90	
SBT	2	3200	658	.42*	555	.29*
SBR	0	0	211		286	
EBL	0	0	0		0	
EBT	2	3200	731	.27*	428	.17*
EBR	0	0	134		129	
WBL	1	1600	59	.04*	224	.14*
WBT	2	3200	165	.05	595	.19
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .73 .60

11 . SR-55 Frontage Road NB Ramps at Paularino

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	78		129	
NBT	2	3200	646	.23*	679	.25*
NBR	d	1600	145	.09	76	.05
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	1	1600	307	.19*	256	.16*
EBT	2	3200	881	.28	320	.10
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	150	.09*	685	.33*
WBR	0	0	201	.13	379	
Right Turn Adjustment			WBR	.04*		

TOTAL CAPACITY UTILIZATION .55 .74

12 . SR-55 SB Frontage Road at Baker Street

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	413	{.26}*	178	
SBT	2	3200	132	.21	338	.27*
SBR	0	0	252	.16	434	.27
EBL	0	0	0		0	
EBT	2	3200	1113	.35*	545	.17
EBR	1	1600	243	.15	394	.25
WBL	1	1600	49	.03*	210	.13
WBT	2	3200	401	.13	953	.30*
WBR	0	0	0		0	
Right Turn Adjustment					EBR	.08*

TOTAL CAPACITY UTILIZATION .64 .65

13 . SR-55 NB Frontage Road at Baker Street

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	309		385	
NBT	2	3200	364	.30*	440	.34*
NBR	0	0	288		272	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	1	1600	527	.33*	271	.17*
EBT	2	3200	969	.30	377	.12
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	212	.07*	822	.26*
WBR	1	1600	124	.08	331	.21
Right Turn Adjustment			WBR	.01*		

TOTAL CAPACITY UTILIZATION .71 .77

50 . Red Hill Avenue at Paularino

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	10	.00	179	.06*
NBT	2	3200	107	.04	620	.20
NBR	0	0	15		19	
SBL	1	1600	163	.10	12	.01
SBT	2	3200	346	.14*	949	.43*
SBR	0	0	105		431	
EBL	1	1600	128	.08	171	.11*
EBT	2	3200	895	.29*	72	.04
EBR	0	0	35		45	
WBL	1	1600	25	.02*	40	.03
WBT	2	3200	302	.11	290	.10*
WBR	0	0	45		32	

TOTAL CAPACITY UTILIZATION .45 .70

51 . Red Hill Avenue at Baker Street

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	158	.05	320	.10*
NBT	2	3200	680	.23*	517	.17
NBR	0	0	59		11	
SBL	1	1600	22	.01*	9	.01
SBT	2	3200	354	.15	663	.35*
SBR	0	0	124		467	
EBL	1.5		577	{.19}*	462	.14*
EBT	1.5	4800	351	.19	111	.07
EBR	1	1600	327	.20	84	.05
WBL	1	1600	5	.00	65	.04
WBT	2	3200	46	.02*	343	.12*
WBR	0	0	11		36	

TOTAL CAPACITY UTILIZATION .45 .71

52 . Red Hill Avenue at Bristol Street

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	110	.03	113	.04*
NBT	1.5	4800	358	.11*	147	.05
NBR	1.5		51		27	
SBL	2	3200	183	.06*	345	.11
SBT	2	3200	165	.05	550	.17*
SBR	1	1600	27	.02	242	.15
EBL	2	3200	281	.09*	105	.03*
EBT	3	4800	669	.14	666	.14
EBR	1	1600	83	.05	142	.09
WBL	2	3200	55	.02	126	.04
WBT	2.5	6400	408	{.11}*	1047	.22*
WBR	1.5		345		157	

TOTAL CAPACITY UTILIZATION .37 .46

541 . Bear Street at Baker Street

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	84	.05*	251	.16*
NBT	1	1600	119	.09	247	.17
NBR	0	0	32		31	
SBL	2	3200	212	.07	167	.05
SBT	1	1600	200	.13*	227	.14*
SBR	2	3200	269	.08	531	.17
EBL	2	3200	451	.14	314	.10*
EBT	2	3200	874	.34*	661	.25
EBR	0	0	217		145	
WBL	1	1600	51	.03*	53	.03
WBT	2	3200	326	.10	1302	.41*
WBR	1	1600	81	.05	127	.08

TOTAL CAPACITY UTILIZATION .55 .81

542 . Bear Street at Paularino

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	129	.08*	32	.02
NBT	3	4800	821	.17	1520	.35*
NBR	0	0	5		161	
SBL	1	1600	17	.01	82	.05*
SBT	3	4800	715	.20*	836	.18
SBR	0	0	261		20	
EBL	1	1600	147	.09*	17	.01
EBT	1	1600	7	.04	5	.03*
EBR	0	0	57		48	
WBL	1	1600	8	.01	190	.12*
WBT	1	1600	33	.02*	24	.02
WBR	1	1600	65	.04	176	.11

TOTAL CAPACITY UTILIZATION .39 .55

545 . Bristol at Sunflower

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	160	.05*	566	.18
NBT	2.5	6400	742	{.15}	1597	.33*
NBR	1.5		301	{.13}	174	.11
SBL	2	3200	242	.08	148	.05*
SBT	3	4800	959	.20*	928	.19
SBR	1	1600	111	.07	230	.14
EBL	2	3200	95	.03	328	.10
EBT	2.5	6400	1144	{.25}*	1171	{.24}*
EBR	1.5		546		410	{.11}
WBL	2	3200	248	.08*	269	.08*
WBT	3	4800	324	.07	548	.11
WBR	1	1600	172	.11	282	.18

TOTAL CAPACITY UTILIZATION .58 .70

546 . Bristol at Anton

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	53	.02	462	.14*
NBT	4	6400	1101	.17*	2060	.32
NBR	f		1007		526	
SBL	2	3200	208	.07*	168	.05
SBT	4	6400	1372	.21	1459	.23*
SBR	1	1600	12	.01	48	.03
EBL	1	1600	7	.00	55	.03
EBT	1	1600	18	.01*	52	.03*
EBR	1	1600	6	.00	116	.07
WBL	3	4800	266	.06*	969	.20*
WBT	1	1600	13	.01	115	.07
WBR	1	1600	72	.05	271	.17

TOTAL CAPACITY UTILIZATION .31 .60

547 . Bristol and Paularino

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	21	.01	108	.07*
NBT	3	4800	907	.20*	1171	.27
NBR	0	0	67		103	
SBL	2	3200	290	.09*	259	.08
SBT	3	4800	906	.19	1461	.32*
SBR	0	0	17		94	
EBL	1	1600	194	.12	111	.07*
EBT	1	1600	283	.19*	171	.14
EBR	0	0	27		47	
WBL	1	1600	54	.03*	163	.10
WBT	1	1600	120	.08	463	.29*
WBR	1	1600	163	.10	282	.18

TOTAL CAPACITY UTILIZATION .51 .75

548 . Bristol Street at Baker Street

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	60	.02	182	.06
NBT	3	4800	425	.09*	901	.19*
NBR	1	1600	173	.11	142	.09
SBL	2	3200	302	.09*	243	.08*
SBT	3	4800	605	.13	856	.18
SBR	1	1600	119	.07	484	.30
EBL	2	3200	226	.07	232	.07*
EBT	2	3200	841	.28*	456	.17
EBR	0	0	65		93	
WBL	2	3200	146	.05*	243	.08
WBT	2	3200	275	.09	833	.26*
WBR	1	1600	257	.16	389	.24
Right Turn Adjustment					SBR	.04*

TOTAL CAPACITY UTILIZATION .51 .64

549 . Bristol Street at Newport Boulevard Southbound

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	152	.05*	587	.18*
NBT	3	4800	737	.15	1264	.26
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	768	.16*	667	.14*
SBR	d	1600	315	.20	477	.30
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			SBR	.04*	SBR	.16*

TOTAL CAPACITY UTILIZATION .25 .48

550 . Bristol Street at Newport Boulevard Northb

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	557	.12	1308	.27*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	702	.15*	705	.15
SBR	0	0	0		0	
EBL	1.5		306	{.13}*	378	.12*
EBT	0	4800	0	.13	0	
EBR	1.5		314		201	{.04}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .28 .39

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\wProj\EXE-193\ICU\Y08WP-COM02-102809

715 . Bristol at I-405 NB Off Ramps

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6400	1592	.25*	1963	.31*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	5	8000	1735	.22	2304	.30
SBR	0	0	14		63	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	2	3200	47	.01	305	.10
WBL	1.5		107		199	
WBT	1.5	4800	66	.04*	295	.10*
WBR	2	3200	570	.18	841	.26
Right Turn Adjustment			WBR	.14*	Multi	.25*
TOTAL CAPACITY UTILIZATION				.43		.66

716 . Bristol at I-405 SB Off Ramps

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	145	.09*	198	.12*
NBT	4	6400	1110	.17	1924	.30
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	949	.20*	1569	.33*
SBR	f		876		1217	
EBL	3	4800	708	.15*	648	.14*
EBT	0	0	0		0	
EBR	1	1600	506	.32	192	.12
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.10*		
TOTAL CAPACITY UTILIZATION				.54		.59

717 . Bear Street at SR-73 SB Ramps

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3200	391	.24*	917	.36*
NBR	0	0	380		242	
SBL	2	3200	588	.18*	973	.30*
SBT	2	3200	479	.15	1168	.37
SBR	0	0	0		0	
EBL	1.5		107	.07*	222	{.13}*
EBT	0	3200	0		0	.13
EBR	0.5		175	.11	193	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
TOTAL CAPACITY UTILIZATION				.49		.79

718 . Bear Street at SR-73 NB Ramps

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	110	.07*	325	.20*
NBT	2	3200	332	.10	609	.19
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	831	.20*	1087	.29*
SBR	0	0	107		291	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	139	.09*	252	.16*
WBT	0	0	0		0	
WBR	2	3200	483	.15	1045	.33
TOTAL CAPACITY UTILIZATION				.36		.65

721 . Flower at Sunflower

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	20	.01*	42	.03
NBT	2	3200	37	.01	351	.11*
NBR	1	1600	24	.02	55	.03
SBL	1	1600	130	.08	51	.03*
SBT	2	3200	191	.10*	145	.09
SBR	0	0	118		170	.11
EBL	2	3200	45	.01	220	.07*
EBT	3	4800	650	.14*	646	.15
EBR	0	0	39		56	
WBL	2	3200	36	.01*	48	.02
WBT	3	4800	352	.08	1100	.25*
WBR	0	0	42		83	

TOTAL CAPACITY UTILIZATION .26 .46

722 . Anton at Sunflower

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	9	.01*	9	.01*
NBT	0	0	0		0	
NBR	2	3200	216	.07	513	.16
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	967	.21*	718	.15*
EBR	0	0	31		25	
WBL	1	1600	251	.16*	316	.20*
WBT	3	4800	449	.09	1373	.29
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .38 .36

726 . Main Street at Sunflower

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	378	.12*	1060	.33*
NBT	3	4800	244	.05	904	.19
NBR	0	0	3		1	
SBL	1	1600	9	.01	1	.00
SBT	2	3200	601	.19*	334	.10*
SBR	1	1600	249	.16	586	.37
EBL	1.5		486	{.15}*	550	{.17}*
EBT	0.5	3200	0	.15	0	.17
EBR	2	3200	729	.23	553	.17
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.14*

TOTAL CAPACITY UTILIZATION .46 .74

735 . Newport Boulevard NB at Del Mar

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		79		115	
NBT	2.5	4800	1149	.26*	719	.17*
NBR	d	1600	90	.06	115	.07
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	765	.24*	460	.14*
EBT	2	3200	310	.10	399	.12
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	186	.06*	245	.08*
WBR	1	1600	373	.23	204	.13
Right Turn Adjustment			WBR	.17*	WBR	.05*

TOTAL CAPACITY UTILIZATION .73 .44

736 . Newport Boulevard SB at Fair Drive/Del Mar

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	137	.09	270	.17
SBT	3	4800	436	.09*	1231	.26*
SBR	f		428		1111	
EBL	0	0	0		0	
EBT	4	6400	862	.14*	558	.09*
EBR	0	0	31		38	
WBL	1	1600	101	.06*	71	.04*
WBT	2	3200	180	.06	287	.09
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .29 .39

737 . Newport Boulevard NB at Mesa Road

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	13	.01	16	.01
NBT	2	3200	401	.13*	362	.11*
NBR	d	1600	174	.11	100	.06
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	60	.02*	59	.02*
EBT	1	1600	153	.10	280	.18
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1600	88	.09*	275	.20*
WBR	0	0	52		44	

TOTAL CAPACITY UTILIZATION .24 .33

738 . Newport Boulevard SB at Mesa Road

2008 WITH PROJECT (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	200	.13	336	.21
SBT	4	6400	933	.15*	2307	.36*
SBR	1	1600	0	.00	0	.00
EBL	0	0	0		0	
EBT	1	1600	2	.00*	3	.00*
EBR	1	1600	0	.00	0	.00
WBL	1	1600	78	.05*	289	.18*
WBT	1	1600	14	.01	5	.00
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .20 .54

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\wProj\EXE-193\ICU\Y08WP-IRV01-102809

42 . Red Hill Avenue at Barranca Parkway/Dyer R

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	226	.07*	600	.18
NBT	3	5100	583	.13	2079	.45*
NBR	0	0	81		222	
SBL	2	3400	520	.15	490	.14*
SBT	3	5100	1238	.27*	690	.17
SBR	0	0	144		164	
EBL	1	1700	223	.13	206	.12*
EBT	3	5100	1104	.28*	922	.20
EBR	0	0	319		111	
WBL	1	1700	403	.24*	113	.07
WBT	3	5100	811	.22	858	.25*
WBR	0	0	317		580	.34
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .91 1.01

43 . Red Hill Avenue at Deere Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	42	.02
NBT	3	5100	837	.16	2569	.50*
NBR	d	1700	91	.05	40	.02
SBL	1	1700	116	.07	41	.02*
SBT	3	5100	1649	.32*	911	.18
SBR	d	1700	123	.07	13	.01
EBL	1	1700	11	.01*	106	.06
EBT	1	1700	38	.05	99	.12*
EBR	0	0	39		108	
WBL	1	1700	20	.01	86	.05*
WBT	1	1700	92	.05*	50	.03
WBR	1	1700	40	.02	280	.16
Right Turn Adjustment					WBR	.03*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .49 .77

44 . Red Hill Avenue at Alton Parkway

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	109	.06	45	.03
NBT	3	5100	856	.22*	1985	.46*
NBR	0	0	288		361	
SBL	1	1700	289	.17*	220	.13*
SBT	3	5100	1303	.26	878	.17
SBR	d	1700	137	.08	24	.01
EBL	1	1700	11	.01*	58	.03
EBT	2	3400	66	.02	263	.08*
EBR	1	1700	41	.02	113	.07
WBL	2	3400	413	.12	476	.14*
WBT	1	1700	235	.14*	144	.08
WBR	1	1700	111	.07	632	.37
Right Turn Adjustment					WBR	.08*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .94

45 . Red Hill Avenue at McGaw Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	564	.17*	188	.06
NBT	3	5100	1077	.27	1878	.41*
NBR	0	0	279		224	
SBL	2	3400	271	.08	141	.04*
SBT	3	5100	1321	.26*	1369	.27
SBR	d	1700	101	.06	78	.05
EBL	1	1700	17	.01	110	.06
EBT	2	3400	58	.03*	173	.10*
EBR	0	0	123	.07	435	.26
WBL	2	3400	293	.09*	284	.08*
WBT	2	3400	188	.11	110	.06
WBR	0	0	175		302	.18
Right Turn Adjustment					Multi	.05*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .73

47 . Red Hill Avenue at MacArthur Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	67	.04*	324	.19
NBT	2	3400	723	.21	906	.27*
NBR	f		32		69	
SBL	2	3400	340	.10	530	.16*
SBT	2	3400	960	.28*	813	.24
SBR	f		451		1103	
EBL	2	3400	1070	.31*	807	.24*
EBT	2	3400	635	.19	423	.12
EBR	1	1700	161	.09	169	.10
WBL	1	1700	68	.04	89	.05
WBT	2	3400	517	.15*	837	.25*
WBR	f		653		766	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .83 .97

48 . Red Hill Avenue at Sky Park North

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	28	.02	23	.01
NBT	2	3400	683	.20*	946	.28*
NBR	d	1700	69	.04	32	.02
SBL	1	1700	164	.10*	93	.05*
SBT	2	3400	817	.24	913	.27
SBR	d	1700	157	.09	69	.04
EBL	1	1700	42	.02*	98	.06*
EBT	1	1700	32	.02	34	.02
EBR	1	1700	14	.01	41	.02
WBL	1	1700	18	.01	103	.06
WBT	1	1700	25	.07*	89	.19*
WBR	0	0	94		240	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .44 .63

49 . Red Hill Avenue at Main Street

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	196	.06*	308	.09*
NBT	2	3400	717	.21	729	.21
NBR	1	1700	394	.23	254	.15
SBL	2	3400	110	.03	172	.05
SBT	2	3400	577	.20*	798	.34*
SBR	0	0	119		344	
EBL	2	3400	168	.05	227	.07
EBT	3	5100	1223	.30*	1108	.30*
EBR	0	0	301		405	
WBL	2	3400	184	.05*	419	.12*
WBT	3	5100	537	.12	1392	.29
WBR	0	0	84		112	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .90

70 . Gillette Avenue at Main Street

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	61	.02*	291	.09*
NBT	1	1700	7	.00	25	.01
NBR	1	1700	32	.02	476	.28
SBL	2	3400	55	.02	314	.09
SBT	1	1700	28	.02*	21	.01*
SBR	d	1700	50	.03	291	.17
EBL	2	3400	330	.10*	100	.03*
EBT	4	6800	1094	.16	1481	.22
EBR	f		341		82	
WBL	2	3400	237	.07	60	.02
WBT	3	5100	1030	.27*	1117	.24*
WBR	0	0	322		94	
Right Turn Adjustment					Multi	.37*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .46 .79

71 . Armstrong Avenue at Barranca Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	89	.03*	204	.06*
NBT	0	0	0		0	
NBR	1	1700	30	.02	247	.15
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	1	1700	3	.00	41	.02
EBT	3	5100	1245	.24*	1346	.26*
EBR	d	1700	113	.07	110	.06
WBL	1	1700	221	.13*	118	.07*
WBT	3	5100	1635	.32	1293	.25
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.04*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .48

77 . MacArthur Boulevard at Sky Park East

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	125	.07*	96	.06
NBT	3	5100	1105	.22	1597	.31*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6800	1012	.17*	946	.15
SBR	0	0	148		64	
EBL	2	3400	34	.01*	169	.05*
EBT	0	0	0		0	
EBR	1	1700	68	.04	261	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .30 .41

78 . MacArthur Boulevard at Main Street

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	795	.23*	697	.21*
NBT	4	6800	895	.13	1178	.17
NBR	f		1323		505	
SBL	2	3400	409	.12	255	.08
SBT	4	6800	656	.10*	1113	.16*
SBR	1	1700	84	.05	83	.05
EBL	1	1700	63	.04	73	.04
EBT	3	5100	656	.13*	720	.14*
EBR	1	1700	329	.19	584	.34
WBL	2	3400	271	.08*	635	.19*
WBT	3	5100	548	.11	752	.15
WBR	f		187		562	
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .59 .75

79 . MacArthur Boulevard at I-405 NB Ramps

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	2263	.33*	2000	.29*
NBR	2	3400	365	.11	1136	.33
SBL	2	3400	209	.06*	609	.18*
SBT	4	6800	1190	.18	1697	.25
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	939	.28*	573	.17*
WBT	0	0	0		0	
WBR	2	3400	725	.21	304	.09
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .69

80 . MacArthur Boulevard at I-405 SB Ramps

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1447	.21*	2458	.36*
NBR	1	1700	371	.22	695	.41
SBL	2	3400	198	.06*	594	.17*
SBT	4	6800	1501	.22	1418	.21
SBR	1	1700	404	.24	319	.19
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	1089	.32*	702	.21*
WBT	1	1700	254	.15	273	.16
WBR	f		1122		659	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.64		.79

82 . MacArthur Boulevard at Michelson Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	218	.13*	129	.08
NBT	4	6800	1147	.17	1615	.24*
NBR	1	1700	300	.18	149	.09
SBL	2	3400	431	.13	764	.22*
SBT	4	6800	2120	.31*	1825	.27
SBR	0	0	0		0	
EBL	2	3400	263	.08*	380	.11
EBT	2	3400	174	.07	195	.08*
EBR	0	0	50		85	
WBL	2	3400	70	.02	458	.13*
WBT	1	1700	87	.05*	117	.07
WBR	1	1700	442	.26	927	.55
Right Turn Adjustment					WBR	.23*
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for WBR						
TOTAL CAPACITY UTILIZATION				.62		.95

83 . MacArthur Boulevard at Douglas Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1371	.22*	1427	.22*
NBR	0	0	97		71	
SBL	2	3400	451	.13*	302	.09*
SBT	4	6800	1607	.24	1986	.29
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	27	.02*	68	.04*
WBT	0	0	0		0	
WBR	1	1700	262	.15	430	.25
Right Turn Adjustment			WBR	.03*	WBR	.14*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.45		.54

87 . Dupont Drive at Michelson Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	48	.03	204	.12*
NBT	2	3400	133	.05*	208	.08
NBR	0	0	23		59	
SBL	1	1700	15	.01*	85	.05
SBT	2	3400	88	.03	146	.07*
SBR	0	0	16		102	
EBL	1	1700	58	.03	39	.02*
EBT	2	3400	712	.29*	593	.19
EBR	0	0	285		56	
WBL	1	1700	20	.01*	24	.01
WBT	3	5100	549	.12	1125	.23*
WBR	0	0	61		42	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.41		.49

97 . Von Karman Avenue/Tustin Ranch Road at Bar

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	255	.08*	447	.13*
NBT	2	3400	39	.01	32	.01
NBR	d	1700	70	.04	679	.40
SBL	2	3400	0	.00	0	.00
SBT	2	3400	0	.00*	18	.01*
SBR	2	3400	83	.02	44	.01
EBL	1	1700	3	.00	3	.00
EBT	3	5100	735	.14*	1278	.25*
EBR	d	1700	324	.19	265	.16
WBL	2	3400	899	.26*	187	.06*
WBT	3	5100	1224	.24	950	.19
WBR	1	1700	25	.01	5	.00
Right Turn Adjustment					NBR	.21*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .71

98 . Von Karman Avenue at Alton Parkway

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	66	.04*	175	.10
NBT	2	3400	311	.09	1029	.30*
NBR	d	1700	60	.04	487	.29
SBL	1	1700	33	.02	165	.10*
SBT	2	3400	1064	.31*	320	.09
SBR	d	1700	95	.06	91	.05
EBL	1	1700	39	.02*	77	.05
EBT	2	3400	244	.07	975	.29*
EBR	d	1700	109	.06	111	.07
WBL	1	1700	393	.23	111	.07*
WBT	2	3400	1062	.31*	593	.17
WBR	d	1700	131	.08	71	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .73 .81

99 . Von Karman Avenue at McGaw Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	106	.06*	72	.04
NBT	2	3400	332	.10	1967	.58*
NBR	d	1700	34	.02	109	.06
SBL	1	1700	41	.02	40	.02*
SBT	2	3400	1468	.43*	475	.14
SBR	d	1700	93	.05	22	.01
EBL	1	1700	11	.01*	97	.06
EBT	2	3400	169	.07	587	.20*
EBR	0	0	72		102	
WBL	1	1700	86	.05	41	.02*
WBT	2	3400	556	.17*	260	.10
WBR	0	0	28		74	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .87

100 . Von Karman Avenue at Main Street

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	190	.06*	392	.12
NBT	2	3400	339	.10	1078	.32*
NBR	1	1700	75	.04	260	.15
SBL	1	1700	84	.05	150	.09*
SBT	2	3400	1221	.36*	587	.17
SBR	1	1700	305	.18	217	.13
EBL	2	3400	298	.09*	574	.17
EBT	3	5100	547	.11	1624	.32*
EBR	f		392		241	
WBL	2	3400	324	.10	123	.04*
WBT	3	5100	1082	.24*	685	.16
WBR	0	0	132		108	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .80 .82

101 . Von Karman Avenue at Morse Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	252	.07*	83	.02
NBT	2	3400	592	.20	1392	.42*
NBR	0	0	102		46	
SBL	1	1700	140	.08	25	.01*
SBT	2	3400	1235	.36*	866	.25
SBR	f		187		46	
EBL	1	1700	20	.01	88	.05*
EBT	1	1700	9	.01*	3	.00
EBR	f		53		253	
WBL	1	1700	43	.03*	94	.06
WBT	1	1700	3	.02	13	.10*
WBR	0	0	36		159	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .63

102 . Von Karman Avenue at Michelson Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	49	.03	85	.05*
NBT	2	3400	932	.27*	994	.29
NBR	1	1700	97	.06	92	.05
SBL	1	1700	166	.10*	279	.16
SBT	2	3400	809	.27	1443	.47*
SBR	0	0	99		168	
EBL	1	1700	134	.08*	185	.11*
EBT	2	3400	244	.09	550	.19
EBR	0	0	52		94	
WBL	1	1700	165	.10	182	.11
WBT	2	3400	581	.17*	747	.22*
WBR	f		434		362	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .90

103 . Von Karman Avenue at Dupont Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	72	.04	34	.02*
NBT	2	3400	1066	.33*	1054	.34
NBR	0	0	49		87	
SBL	1	1700	60	.04*	85	.05
SBT	2	3400	809	.24	1423	.42*
SBR	1	1700	25	.01	29	.02
EBL	1	1700	4	.00	20	.01
EBT	2	3400	153	.06*	186	.11*
EBR	0	0	64		172	
WBL	1	1700	83	.05*	71	.04*
WBT	2	3400	181	.07	277	.12
WBR	0	0	73		120	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .64

104 . Von Karman Avenue at Martin

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	31	.02	20	.01*
NBT	2	3400	1030	.30*	972	.29
NBR	1	1700	12	.01	34	.02
SBL	1	1700	15	.01*	27	.02
SBT	2	3400	683	.27	1420	.48*
SBR	0	0	234		209	
EBL	2	3400	97	.03*	176	.05*
EBT	1	1700	1	.01	3	.03
EBR	0	0	23		49	
WBL	1	1700	4	.00	29	.02
WBT	1	1700	2	.01*	9	.03*
WBR	0	0	8		50	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .40 .62

112 . Myford Road at Michelle Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	45	.01*	19	.01*
NBT	0	0	0		0	
NBR	1	1700	72	.04	244	.14
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	62	.02*	456	.13*
EBR	d	1700	10	.01	20	.01
WBL	1	1700	131	.08*	47	.03*
WBT	2	3400	214	.06	60	.02
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.11*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .16 .33

113 . Myford Road at Walnut Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	6	.00	98	.06
NBT	1	1700	5	.00*	62	.04*
NBR	f		69		280	
SBL	2	3400	67	.02*	99	.03*
SBT	1	1700	18	.01	8	.00
SBR	1	1700	100	.06	85	.05
EBL	1	1700	73	.04	40	.02*
EBT	2	3400	796	.23*	758	.22
EBR	d	1700	41	.02	10	.01
WBL	2	3400	329	.10*	46	.01
WBT	2	3400	692	.20	1038	.31*
WBR	1	1700	171	.10	69	.04
Right Turn Adjustment					SBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .40 .47

114 . Millikan Avenue/District Way at Barranca P

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	238	.14*	123	.07
NBT	2	3400	48	.01	65	.02*
NBR	d	1700	36	.02	262	.15
SBL	2	3400	79	.02	411	.12*
SBT	0.5	3400	56	.04*	44	{.03}
SBR	1.5		81		137	{.01}
EBL	2	3400	36	.01*	120	.04
EBT	3	5100	495	.10	1401	.27*
EBR	d	1700	139	.08	178	.10
WBL	1	1700	103	.06	14	.01*
WBT	2	3400	1509	.44*	651	.19
WBR	1	1700	147	.09	571	.34
Right Turn Adjustment					Multi	.13*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .60

115 . Millikan Avenue at Alton Parkway

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	18	.01*	43	.03
NBT	1	1700	13	.01	46	.03*
NBR	1	1700	20	.01	56	.03
SBL	1	1700	65	.04	83	.05*
SBT	1	1700	61	.04*	18	.01
SBR	1	1700	139	.08	185	.11
EBL	1	1700	78	.05*	258	.15
EBT	2	3400	260	.08	978	.29*
EBR	d	1700	48	.03	35	.02
WBL	1	1700	65	.04	24	.01*
WBT	2	3400	924	.27*	491	.14
WBR	d	1700	134	.08	74	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .42 .43

116 . Cartwright Road at Main Street

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	45	.03*	89	.05*
NBT	1	1700	2	.00	2	.00
NBR	1	1700	66	.04	326	.19
SBL	2	3400	9	.00	95	.03
SBT	1	1700	3	.01*	4	.04*
SBR	0	0	14		60	
EBL	1	1700	47	.03*	21	.01
EBT	3	5100	505	.11	1934	.39*
EBR	0	0	71		58	
WBL	2	3400	299	.09	80	.02*
WBT	3	5100	1527	.32*	1066	.21
WBR	0	0	80		10	
Right Turn Adjustment					NBR	.11*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .44 .66

119 . Teller Avenue at Michelson Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	27	.01	85	.03
NBT	1	1700	55	.06*	155	.34*
NBR	0	0	41		422	
SBL	1	1700	160	.09*	105	.06*
SBT	1	1700	204	.12	102	.06
SBR	1	1700	409	.24	187	.11
EBL	1	1700	17	.01	70	.04
EBT	3	5100	406	.08*	1149	.23*
EBR	1	1700	64	.04	139	.08
WBL	1	1700	541	.32*	36	.02*
WBT	3	5100	1471	.29	788	.15
WBR	1	1700	50	.03	41	.02
Right Turn Adjustment			SBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .70

126 . Jamboree Road at Bryan Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	108	.03*	272	.08
NBT	4	6800	668	.10	2030	.30*
NBR	1	1700	98	.06	338	.20
SBL	2	3400	165	.05	50	.01*
SBT	4	6800	2297	.34*	862	.13
SBR	d	1700	102	.06	149	.09
EBL	2	3400	61	.02	216	.06
EBT	2	3400	237	.07*	408	.12*
EBR	d	1700	232	.14	127	.07
WBL	2	3400	470	.14*	263	.08*
WBT	2	3400	387	.11	381	.11
WBR	1	1700	231	.14	158	.09
Right Turn Adjustment			EBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .56

127 . Jamboree Road at El Camino Real

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	254	.07*	491	.14
NBT	4	6800	746	.11	1734	.26*
NBR	1	1700	506	.30	233	.14
SBL	1	1700	139	.08	77	.05*
SBT	4	6800	2572	.38*	884	.13
SBR	1	1700	112	.07	171	.10
EBL	1	1700	69	.04	189	.11
EBT	1	1700	122	.07*	137	.08*
EBR	2	3400	244	.07	326	.10
WBL	2	3400	278	.08*	644	.19*
WBT	2	3400	45	.02	216	.11
WBR	0	0	35		162	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .63

128 . Jamboree Road at I-5 NB Ramps

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1227	.24	2654	.52*
NBR	f		721		634	
SBL	0	0	0		0	
SBT	3	5100	1806	.35*	1490	.29
SBR	f		474		480	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		879	.26*	311	.18*
WBT	0	5100	0		0	
WBR	1.5		454	{.18}	897	.26
Right Turn Adjustment					WBR	.08*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .83

129 . Jamboree Road at I-5 SB Ramps

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1514	.30	2560	.50*
NBR	f		386		915	
SBL	0	0	0		0	
SBT	3	5100	2027	.40*	1370	.27
SBR	f		512		434	
EBL	1.5		441	.26*	684	{.23}*
EBT	0	5100	0		0	{.23}
EBR	1.5		1048	.31	757	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .78

130 . Jamboree Road at Michelle Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	115	.07*	73	.04
NBT	3	5100	1480	.29	2929	.57*
NBR	d	1700	0	.00	1	.00
SBL	1	1700	2	.00	11	.01*
SBT	3	5100	3290	.65*	2034	.40
SBR	d	1700	502	.30	154	.09
EBL	2	3400	114	.03*	518	.15*
EBT	1	1700	1	.00	3	.00
EBR	1	1700	62	.04	153	.09
WBL	1	1700	0	.00	1	.00
WBT	1	1700	0	.00*	1	.00*
WBR	0	0	1		3	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .80 .78

131 . Jamboree Road SB at Walnut Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	205	.06	242	.07
SBT	2	3400	744	.22*	592	.17*
SBR	1	1700	228	.13	163	.10
EBL	0	0	0		0	
EBT	3	5100	297	.06*	487	.10*
EBR	1	1700	280	.16	360	.21
WBL	2	3400	310	.09*	235	.07*
WBT	3	5100	466	.09	770	.15
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.10*	EBR	.11*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .50

132 . Jamboree Road NB at Walnut Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	351	.10*	688	.20*
NBT	2	3400	298	.09	461	.14
NBR	d	1700	137	.08	459	.27
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3400	47	.01*	141	.04*
EBT	3	5100	437	.09	651	.13
EBR	0	0	0		0	
WBL	0	0	4		0	
WBT	3	5100	754	.15*	692	.14*
WBR	1	1700	296	.17	258	.15
Right Turn Adjustment			WBR	.01*	NBR	.03*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.32		.46

133 . Jamboree Road at Edinger Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	112	.03	229	.07
NBT	0	0	0		0	
NBR	1	1700	67	.04	285	.17
SBL	2	3400	188	.06*	273	.08*
SBT	0	0	0		0	
SBR	f		884		298	
EBL	2	3400	204	.06*	565	.17*
EBT	3	5100	424	.11	900	.20
EBR	0	0	119		129	
WBL	2	3400	168	.05	97	.03
WBT	3	5100	1041	.20*	601	.12*
WBR	1	1700	274	.16	173	.10
Right Turn Adjustment					NBR	.10*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.37		.52

134 . Loop Road/Park Avenue at Warner Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	14	.01	15	.01
NBT	1	1700	14	.01*	128	.08*
NBR	1	1700	98	.06	488	.29
SBL	1	1700	285	.17*	302	.18*
SBT	2	3400	185	.05	394	.12
SBR	1	1700	806	.47	74	.04
EBL	1	1700	5	.00	10	.01
EBT	2	3400	76	.02	1177	.35*
EBR	1	1700	5	.00	17	.01
WBL	2	3400	64	.02	183	.05*
WBT	2	3400	225	.07*	107	.03
WBR	1	1700	10	.01	15	.01
Right Turn Adjustment			Multi	.31*	NBR	.17*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.61		.88

136 . Jamboree Road at Barranca Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	195	.06*	217	.06
NBT	4	6800	1054	.16	3005	.44*
NBR	f		184		240	
SBL	2	3400	370	.11	319	.09*
SBT	4	6800	2996	.44*	1546	.23
SBR	f		1035		277	
EBL	2.5		169	.05	1070	.21*
EBT	2.5	8500	518	.10*	631	.19
EBR	1	1700	92	.05	119	.07
WBL	2	3400	239	.07	268	.08
WBT	3	5100	671	.13*	662	.13*
WBR	f		173		414	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing

TOTAL CAPACITY UTILIZATION .78 .92

137 . Jamboree Road at Beckman Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04*	12	.01
NBT	4	6800	1333	.21	3294	.49*
NBR	0	0	111		36	
SBL	1	1700	59	.03	40	.02*
SBT	4	6800	3206	.50*	1857	.28
SBR	0	0	184		47	
EBL	1	1700	51	.03*	225	.13*
EBT	1	1700	14	.01	41	.02
EBR	d	1700	29	.02	11	.01
WBL	1	1700	81	.05	51	.03
WBT	1	1700	58	.06*	29	.04*
WBR	0	0	47		46	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .73

138 . Jamboree Road at Alton Parkway

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	286	.08*	227	.07
NBT	4	6800	1178	.17	2853	.42*
NBR	1	1700	150	.09	206	.12
SBL	2	3400	186	.05	211	.06*
SBT	4	6800	2815	.46*	1693	.27
SBR	0	0	315		146	
EBL	2	3400	54	.02*	207	.06
EBT	3	5100	201	.06	1055	.25*
EBR	0	0	95		196	
WBL	2	3400	160	.05	222	.07*
WBT	3	5100	780	.15*	435	.09
WBR	d	1700	159	.09	194	.11
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .85

139 . Jamboree Road at McGaw Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	224	.07*	77	.02
NBT	4	6800	1462	.22	3161	.47*
NBR	0	0	32		55	
SBL	2	3400	22	.01	51	.02*
SBT	4	6800	2882	.45*	1843	.28
SBR	0	0	210		69	
EBL	1	1700	33	.02*	229	.13
EBT	2	3400	35	.02	315	.17*
EBR	0	0	35		266	
WBL	1	1700	29	.02	32	.02*
WBT	2	3400	293	.10*	77	.03
WBR	0	0	46		36	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .73

140 . Jamboree Road at Kelvin Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	154	.09*	143	.08
NBT	4	6800	1597	.25	3292	.54*
NBR	0	0	112		394	
SBL	1	1700	8	.00	22	.01*
SBT	4	6800	3271	.48*	2367	.35
SBR	d	1700	21	.01	23	.01
EBL	1	1700	33	.02	24	.01
EBT	1	1700	11	.01*	49	.03*
EBR	d	1700	132	.08	113	.07
WBL	1	1700	284	.17*	163	.10*
WBT	1	1700	65	.05	28	.02
WBR	0	0	20		9	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .80 .73

141 . Jamboree Road at Main Street

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	689	.20*	578	.17
NBT	4	6800	1637	.24	2867	.42*
NBR	f		205		481	
SBL	2	3400	475	.14	301	.09*
SBT	4	6800	2711	.40*	2262	.33
SBR	1	1700	629	.37	215	.13
EBL	2	3400	126	.04	481	.14
EBT	3	5100	269	.05*	1200	.24*
EBR	f		311		840	
WBL	2	3400	653	.19*	623	.18*
WBT	3	5100	735	.14	393	.08
WBR	f		96		327	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .89 .98

143 . Jamboree Road at I-405 NB Ramps

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1903	.37*	3691	.72*
NBR	f		607		1099	
SBL	0	0	0		0	
SBT	4	6800	1950	.29	2511	.37
SBR	f		1841		1232	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	3	5100	1457	.29*	733	.14*
WBT	0	0	0		0	
WBR	f		922		268	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .71 .91

144 . Jamboree Road at I-405 SB Ramps

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1670	.25	3193	.47*
NBR	f		570		1089	
SBL	0	0	0		0	
SBT	4	6800	3054	.45*	2737	.40
SBR	f		325		662	
EBL	1.5		827	{.41}*	1510	.44*
EBT	0	6800	0	.41	0	
EBR	2.5		1992		1210	.36
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .91 .96

145 . Jamboree Road at Michelson Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	188	.11*	75	.04
NBT	4	6800	1345	.20	2308	.34*
NBR	1	1700	212	.12	491	.29
SBL	2	3400	949	.28	1218	.36*
SBT	4	6800	2491	.37*	1926	.28
SBR	f		773		490	
EBL	2	3400	316	.09*	1189	.35*
EBT	2	3400	312	.09	414	.12
EBR	1	1700	56	.03	170	.10
WBL	2	3400	309	.09	381	.11
WBT	2	3400	495	.15*	376	.11*
WBR	f		607		940	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .77 1.21

146 . Jamboree Road at Dupont Road

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	203	.12*	106	.06
NBT	4	6800	1495	.22	2335	.34*
NBR	1	1700	8	.00	27	.02
SBL	1	1700	117	.07	183	.11*
SBT	3	5100	2163	.42*	1981	.39
SBR	d	1700	705	.41	304	.18
EBL	2	3400	124	.04*	490	.14
EBT	1	1700	41	.05	104	.24*
EBR	0	0	40		307	
WBL	1	1700	28	.02	27	.02*
WBT	2	3400	103	.06*	67	.04
WBR	0	0	141	.08	65	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .76

164 . Construction South at Barranca Parkway

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	31	.02*	342	.20*
NBT	1	1700	16	.02	48	.17
NBR	0	0	11		240	
SBL	1	1700	41	.02	93	.05
SBT	1	1700	69	.04*	46	.03*
SBR	1	1700	167	.10	216	.13
EBL	1	1700	323	.19*	159	.09*
EBT	3	5100	676	.13	1038	.20
EBR	1	1700	123	.07	24	.01
WBL	1	1700	204	.12	72	.04
WBT	3	5100	727	.14*	1061	.21*
WBR	d	1700	126	.07	71	.04
Right Turn Adjustment					SBR	.03*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .44 .61

168 . Murphy Avenue at Alton Parkway

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	22	.01	75	.04
NBT	1	1700	19	.07*	163	.30*
NBR	0	0	104		353	
SBL	1	1700	30	.02*	97	.06*
SBT	1	1700	62	.05	67	.12
SBR	0	0	30		131	
EBL	1	1700	112	.07*	52	.03
EBT	3	5100	439	.09	1285	.25*
EBR	d	1700	41	.02	37	.02
WBL	1	1700	153	.09	96	.06*
WBT	3	5100	1098	.22*	661	.13
WBR	d	1700	117	.07	27	.02
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .43 .72

170 . Union at Main Street

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	159	.05*	649	.19*
NBT	1	1700	16	.02	8	.05
NBR	0	0	12		74	
SBL	1	1700	12	.01	35	.02
SBT	1	1700	6	.00*	4	.00*
SBR	1	1700	36	.02	56	.03
EBL	2	3400	103	.03*	115	.03
EBT	3	5100	508	.10	1806	.35*
EBR	f		316		108	
WBL	2	3400	55	.02	30	.01*
WBT	3	5100	1359	.27*	633	.13
WBR	0	0	8		29	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .40 .60

171 . Veneto at Main Street

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	232	.07*	151	.04
NBT	1	1700	6	.02	23	.11*
NBR	0	0	24		161	
SBL	1	1700	42	.02	27	.02*
SBT	1	1700	11	.05*	7	.02
SBR	0	0	73		23	
EBL	1	1700	24	.01*	104	.06
EBT	3	5100	318	.07	1635	.34*
EBR	0	0	51		99	
WBL	2	3400	63	.02	37	.01*
WBT	3	5100	1003	.20*	434	.09
WBR	0	0	17		32	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .38 .53

174 . Carlson Avenue at Michelson Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	196	.06*	52	.02*
NBT	2	3400	163	.05	121	.04
NBR	1	1700	97	.06	244	.14
SBL	2	3400	67	.02	249	.07
SBT	1	1700	59	.03*	214	.13*
SBR	f		254		601	
EBL	2	3400	618	.18*	560	.16
EBT	2	3400	822	.24	1347	.40*
EBR	1	1700	60	.04	223	.13
WBL	1	1700	163	.10	224	.13*
WBT	2	3400	1011	.30*	1036	.30
WBR	f		242		249	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .73

175 . Carlson Avenue at Campus Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	148	.09*	186	.11*
SBT	0	0	2		0	
SBR	1	1700	283	.17	224	.13
EBL	1	1700	149	.09*	250	.15
EBT	1	1700	473	.28	1020	.60*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1700	762	.45*	595	.35
WBR	d	1700	90	.05	126	.07
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .76

180 . Harvard Avenue at Walnut Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	204	.06	299	.09*
NBT	1	1700	61	.04*	65	.04
NBR	d	1700	90	.05	214	.13
SBL	1	1700	146	.09*	114	.07
SBT	1	1700	126	.07	49	.03*
SBR	1	1700	121	.07	50	.03
EBL	1	1700	25	.01*	93	.05
EBT	2	3400	223	.07	654	.19*
EBR	1	1700	169	.10	264	.16
WBL	1	1700	127	.07	125	.07*
WBT	2	3400	793	.23*	450	.13
WBR	d	1700	120	.07	29	.02
Right Turn Adjustment					NBR	.03*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .42 .46

181 . Harvard Avenue at Irvine Center Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	276	.08*	257	.08
NBT	2	3400	175	.05	466	.14*
NBR	1	1700	68	.04	229	.13
SBL	1	1700	140	.08	72	.04*
SBT	2	3400	396	.12*	190	.06
SBR	d	1700	130	.08	49	.03
EBL	2	3400	55	.02*	157	.05*
EBT	3	5100	456	.09	985	.19
EBR	1	1700	182	.11	156	.09
WBL	2	3400	260	.08	83	.02
WBT	3	5100	1138	.24*	819	.18*
WBR	0	0	81		102	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .51 .46

182 . Harvard Avenue at Paseo Westpark/Moffett D

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	2	.00	0	.00
NBT	2	3400	368	.11	950	.28*
NBR	d	1700	20	.01	61	.04
SBL	1	1700	27	.02	39	.02*
SBT	2	3400	863	.25*	446	.13
SBR	1	1700	3	.00	3	.00
EBL	1	1700	3	.00	1	.00
EBT	1	1700	2	.00*	1	.00*
EBR	d	1700	0	.00	0	.00
WBL	1	1700	74	.04*	24	.01*
WBT	1	1700	0	.00	1	.00
WBR	d	1700	162	.10	78	.05
Right Turn Adjustment					WBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .34 .38

183 . Harvard Avenue at Warner Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	61	.04*	138	.08
NBT	2	3400	258	.08	948	.28*
NBR	d	1700	55	.03	104	.06
SBL	1	1700	60	.04	61	.04*
SBT	2	3400	826	.24*	375	.11
SBR	d	1700	112	.07	43	.03
EBL	1	1700	66	.04*	135	.08*
EBT	2	3400	81	.02	319	.09
EBR	d	1700	55	.03	74	.04
WBL	1	1700	76	.04	36	.02
WBT	2	3400	329	.10*	168	.05*
WBR	d	1700	68	.04	47	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .47 .50

184 . Harvard Avenue at Barranca Parkway

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	177	.10*	266	.16
NBT	2	3400	242	.07	973	.29*
NBR	1	1700	64	.04	123	.07
SBL	1	1700	121	.07	71	.04*
SBT	2	3400	756	.22*	359	.11
SBR	1	1700	169	.10	41	.02
EBL	2	3400	23	.01*	120	.04
EBT	3	5100	310	.06	822	.16*
EBR	1	1700	135	.08	241	.14
WBL	2	3400	183	.05	100	.03*
WBT	3	5100	809	.17*	551	.13
WBR	0	0	40		98	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .57

185 . Harvard Avenue at Alton Parkway

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	256	.15*	170	.10
NBT	2	3400	359	.11	1175	.35*
NBR	d	1700	73	.04	181	.11
SBL	1	1700	37	.02	87	.05*
SBT	2	3400	884	.26*	501	.15
SBR	1	1700	272	.16	76	.04
EBL	2	3400	56	.02*	288	.08
EBT	3	5100	270	.05	1018	.20*
EBR	1	1700	196	.12	259	.15
WBL	2	3400	193	.06	157	.05*
WBT	3	5100	900	.18*	441	.10
WBR	0	0	40		64	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .70

186 . Harvard Avenue at Main Street

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	155	.05*	163	.05
NBT	2	3400	334	.10	1142	.34*
NBR	1	1700	68	.04	297	.17
SBL	2	3400	52	.02	28	.01*
SBT	2	3400	1063	.31*	694	.20
SBR	1	1700	455	.27	137	.08
EBL	2	3400	119	.04	695	.20
EBT	3	5100	213	.06*	1284	.31*
EBR	0	0	110	.06	313	
WBL	2	3400	358	.11*	117	.03*
WBT	3	5100	664	.13	199	.04
WBR	0	0	24		21	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .74

187 . Harvard Avenue at Coronado

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	183	.05*	191	.06
NBT	2	3400	470	.14	1402	.42*
NBR	0	0	10		37	
SBL	1	1700	30	.02	65	.04*
SBT	2	3400	1309	.39*	942	.28
SBR	d	1700	177	.10	64	.04
EBL	2	3400	38	.01*	108	.03
EBT	1	1700	1	.00	72	.04*
EBR	d	1700	149	.09	269	.16
WBL	1	1700	37	.02	16	.01*
WBT	1	1700	11	.01*	11	.01
WBR	1	1700	81	.05	50	.03
Right Turn Adjustment			EBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .56 .56

188 . Harvard Avenue at Michelson Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	96	.06*	101	.06
NBT	2	3400	269	.09	887	.29*
NBR	0	0	21		105	
SBL	1	1700	136	.08	341	.20*
SBT	2	3400	722	.21*	548	.16
SBR	1	1700	599	.35	356	.21
EBL	2	3400	162	.05*	523	.15*
EBT	2	3400	283	.08	944	.28
EBR	f		73		143	
WBL	1	1700	129	.08	72	.04
WBT	2	3400	754	.27*	460	.18*
WBR	0	0	180		160	
Right Turn Adjustment			SBR	.10*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .87

189 . Harvard Avenue at University Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	76	.04*	63	.04
NBT	2	3400	215	.06	570	.17*
NBR	d	1700	36	.02	175	.10
SBL	1	1700	15	.01	73	.04*
SBT	2	3400	453	.13*	465	.14
SBR	d	1700	434	.26	274	.16
EBL	1	1700	133	.08*	523	.31*
EBT	3	5100	479	.10	1568	.32
EBR	0	0	37		61	
WBL	1	1700	117	.07	97	.06
WBT	3	5100	1646	.34*	698	.14*
WBR	0	0	69		30	
Right Turn Adjustment			SBR	.07*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .71 .71

190 . University Drive at Campus Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	75	.04*	180	.11*
NBT	3	5100	496	.10	1387	.27
NBR	1	1700	303	.18	365	.21
SBL	1	1700	108	.06	69	.04
SBT	2	3400	1527	.45*	794	.23*
SBR	1	1700	212	.12	77	.05
EBL	1	1700	180	.11*	334	.20*
EBT	2	3400	364	.11	589	.17
EBR	d	1700	17	.01	98	.06
WBL	1	1700	90	.05	228	.13
WBT	2	3400	342	.10*	516	.15*
WBR	d	1700	213	.13	103	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .75 .74

191 . Mesa Road at University Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	16	.01*	149	.09*
NBT	0	0	0		0	
NBR	1	1700	38	.02	182	.11
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	867	.26	1896	.56*
EBR	1	1700	121	.07	51	.03
WBL	1	1700	153	.09	107	.06*
WBT	2	3400	1634	.48*	951	.28
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .76

192 . California at University Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	35	.01*	256	.08*
NBT	0	0	0		0	
NBR	1	1700	87	.05	751	.44
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	973	.29*	1132	.33*
EBR	1	1700	308	.18	60	.04
WBL	1	1700	705	.41*	87	.05*
WBT	2	3400	970	.29	1046	.31
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.32*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .83

193 . MacArthur Boulevard NB at University Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	54	.03*	20	.01*
NBT	0	0	0		0	
NBR	1	1700	221	.13	293	.17
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1072	.21*	867	.17*
EBR	d	1700	106	.06	86	.05
WBL	2	3400	332	.10*	632	.19*
WBT	2	3400	707	.21	655	.19
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.02*	NBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .41 .44

196 . Hearthstone Boulevard at Irvine Center Dri

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	32	.02*	18	.01*
NBT	2	3400	54	.02	42	.01
NBR	d	1700	257	.15	143	.08
SBL	1	1700	33	.02	23	.01
SBT	1	1700	41	.02*	38	.02*
SBR	d	1700	34	.02	26	.02
EBL	1	1700	26	.02*	96	.06
EBT	3	5100	615	.13	1206	.25*
EBR	0	0	49		70	
WBL	1	1700	128	.08	246	.14*
WBT	3	5100	1286	.25*	1157	.23
WBR	0	0	13		32	
Right Turn Adjustment			NBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .38 .47

198 . Paseo Westpark at Warner Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	81	.05*	60	.04
NBT	1	1700	129	.08	288	.17*
NBR	d	1700	29	.02	37	.02
SBL	1	1700	55	.03	55	.03*
SBT	1	1700	272	.16*	111	.07
SBR	d	1700	57	.03	32	.02
EBL	1	1700	66	.04*	72	.04
EBT	2	3400	192	.06	282	.08*
EBR	d	1700	28	.02	79	.05
WBL	1	1700	39	.02	26	.02*
WBT	2	3400	274	.08*	165	.05
WBR	d	1700	89	.05	51	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .38 .35

199 . Paseo Westpark at Barranca Parkway

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	84	.02*	144	.04
NBT	1	1700	78	.05	299	.18*
NBR	1	1700	124	.07	190	.11
SBL	2	3400	114	.03	63	.02*
SBT	1	1700	244	.14*	138	.08
SBR	d	1700	99	.06	48	.03
EBL	1	1700	19	.01*	85	.05
EBT	3	5100	452	.09	930	.18*
EBR	1	1700	60	.04	139	.08
WBL	1	1700	122	.07	104	.06*
WBT	3	5100	1034	.21*	643	.15
WBR	0	0	33		100	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .43 .49

200 . Paseo Westpark at Alton Parkway

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	87	.05	79	.05
NBT	1	1700	119	.12*	278	.22*
NBR	0	0	90		88	
SBL	1	1700	151	.09*	66	.04*
SBT	1	1700	172	.10	116	.07
SBR	1	1700	219	.13	111	.07
EBL	1	1700	24	.01*	81	.05
EBT	3	5100	483	.11	697	.15*
EBR	0	0	88		54	
WBL	1	1700	119	.07	102	.06*
WBT	3	5100	1038	.20*	608	.12
WBR	d	1700	100	.06	119	.07
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .47 .52

201 . Paseo Westpark at Main Street

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	181	.11	46	.03
NBT	1	1700	169	.19*	276	.20*
NBR	0	0	148		61	
SBL	1	1700	133	.08*	100	.06*
SBT	1	1700	226	.13	125	.07
SBR	1	1700	149	.09	69	.04
EBL	1	1700	16	.01*	69	.04
EBT	2	3400	337	.10	634	.19*
EBR	d	1700	143	.08	109	.06
WBL	1	1700	92	.05	32	.02*
WBT	2	3400	886	.26*	257	.08
WBR	d	1700	106	.06	62	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .52

221 . Culver Drive at Bryan Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	268	.08*	566	.17*
NBT	3	5100	624	.12	1260	.25
NBR	1	1700	187	.11	462	.27
SBL	2	3400	87	.03	101	.03
SBT	3	5100	1659	.33*	726	.14*
SBR	d	1700	195	.11	93	.05
EBL	2	3400	80	.02*	141	.04*
EBT	2	3400	124	.04	297	.09
EBR	1	1700	299	.18	345	.20
WBL	2	3400	456	.13	211	.06
WBT	2	3400	422	.17*	397	.15*
WBR	0	0	149		100	
Right Turn Adjustment			EBR	.06*		
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .71 .55

222 . Culver Drive at Trabuco Road

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	701	.14	1744	.34*
NBR	f		620		974	
SBL	1	1700	82	.05	100	.06*
SBT	3	5100	1620	.32*	988	.19
SBR	f		615		174	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	556	.16*	446	.13*
WBT	0	0	0		0	
WBR	2	3400	250	.07	400	.12
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .58

223 . Culver Drive at I-5 SB Ramps

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1043	.20	1772	.35*
NBR	f		238		300	
SBL	0	0	0		0	
SBT	3	5100	1749	.34*	1225	.24
SBR	f		312		224	
EBL	1.5		418	{.18}*	700	{.29}*
EBT	0	5100	0	.18	0	{.29}
EBR	1.5		509		915	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .69

224 . Culver Drive at Walnut Avenue

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	148	.04*	251	.07
NBT	3	5100	769	.15	1543	.30*
NBR	1	1700	265	.16	333	.20
SBL	2	3400	207	.06	349	.10*
SBT	3	5100	1787	.35*	1331	.26
SBR	d	1700	353	.21	207	.12
EBL	2	3400	254	.07	486	.14*
EBT	2	3400	389	.17*	439	.16
EBR	0	0	181		116	
WBL	2	3400	444	.13*	359	.11
WBT	2	3400	599	.18	483	.14*
WBR	d	1700	255	.15	227	.13
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .74 .73

225 . Culver Drive at Deerfield Drive

2008 WITH PROJECT (IRVINE ISEC)

			AM PK HOUR		PM PK HOUR	
	LANES	CAPACITY	VOL	V/C	VOL	V/C
NBL	2	3400	20	.01*	80	.02
NBT	3	5100	893	.18	1732	.34*
NBR	1	1700	92	.05	131	.08
SBL	2	3400	165	.05	154	.05*
SBT	3	5100	2035	.40*	1449	.28
SBR	1	1700	150	.09	218	.13
EBL	1	1700	176	.10*	329	.19*
EBT	1	1700	154	.09	131	.08
EBR	d	1700	101	.06	136	.08
WBL	1	1700	174	.10	74	.04
WBT	1	1700	110	.20*	60	.10*
WBR	0	0	226		105	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .73

226 . Culver Drive at Irvine Center Drive

2008 WITH PROJECT (IRVINE ISEC)

			AM PK HOUR		PM PK HOUR	
	LANES	CAPACITY	VOL	V/C	VOL	V/C
NBL	2	3400	253	.07*	265	.08
NBT	4	6800	666	.10	1496	.22*
NBR	f		133		367	
SBL	2	3400	150	.04	262	.08*
SBT	4	6800	1853	.27*	1316	.19
SBR	1	1700	244	.14	139	.08
EBL	2	3400	153	.05*	216	.06
EBT	3	5100	480	.09	795	.16*
EBR	f		185		189	
WBL	2	3400	374	.11	224	.07*
WBT	3	5100	924	.18*	763	.15
WBR	f		111		169	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .58

227 . Culver Drive at Warner Avenue

2008 WITH PROJECT (IRVINE ISEC)

			AM PK HOUR		PM PK HOUR	
	LANES	CAPACITY	VOL	V/C	VOL	V/C
NBL	1	1700	50	.03*	92	.05
NBT	3	5100	942	.18	1884	.37*
NBR	1	1700	61	.04	181	.11
SBL	1	1700	117	.07	138	.08*
SBT	3	5100	2214	.43*	1413	.28
SBR	d	1700	112	.07	155	.09
EBL	1	1700	150	.09	177	.10*
EBT	2	3400	168	.05*	151	.04
EBR	d	1700	101	.06	85	.05
WBL	1	1700	205	.12*	68	.04
WBT	2	3400	249	.07	85	.03*
WBR	d	1700	201	.12	122	.07
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .63

228 . Culver Drive at Barranca Parkway

2008 WITH PROJECT (IRVINE ISEC)

			AM PK HOUR		PM PK HOUR	
	LANES	CAPACITY	VOL	V/C	VOL	V/C
NBL	2	3400	84	.02*	172	.05
NBT	3	5100	574	.11	1614	.32*
NBR	1	1700	275	.16	320	.19
SBL	2	3400	359	.11	311	.09*
SBT	3	5100	1915	.38*	1156	.23
SBR	f		238		158	
EBL	2	3400	376	.11	261	.08
EBT	2	3400	770	.23*	585	.17*
EBR	1	1700	165	.10	346	.20
WBL	2	3400	341	.10*	200	.06*
WBT	2	3400	642	.19	488	.14
WBR	d	1700	140	.08	294	.17
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .78 .69

229 . Culver Drive at Alton Parkway

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	112	.03*	251	.07
NBT	3	5100	778	.15	1833	.36*
NBR	1	1700	209	.12	319	.19
SBL	2	3400	112	.03	163	.05*
SBT	3	5100	1929	.38*	1029	.20
SBR	f		246		173	
EBL	2	3400	84	.02	235	.07
EBT	2	3400	464	.14*	740	.22*
EBR	1	1700	138	.08	244	.14
WBL	2	3400	398	.12*	280	.08*
WBT	2	3400	826	.24	607	.18
WBR	1	1700	149	.09	183	.11
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.72		.76

230 . Culver Drive at Main Street

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	161	.05*	145	.04
NBT	3	5100	897	.18	1925	.38*
NBR	1	1700	161	.09	530	.31
SBL	2	3400	45	.01	178	.05*
SBT	3	5100	2025	.40*	1373	.27
SBR	f		417		119	
EBL	2	3400	138	.04	454	.13
EBT	2	3400	128	.04*	449	.13*
EBR	f		136		170	
WBL	2	3400	597	.18*	181	.05*
WBT	2	3400	322	.09	81	.02
WBR	1	1700	83	.05	68	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.72		.66

231 . Culver Drive at San Leandro

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	127	.07*	150	.09
NBT	3	5100	1158	.23	2473	.48*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2661	.52*	1689	.33
SBR	d	1700	124	.07	47	.03
EBL	1	1700	64	.04*	41	.02*
EBT	0	0	0		0	
EBR	1	1700	262	.15	46	.03
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.06*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.74		.55

232 . Culver Drive at I-405 NB Ramps

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	694	.14	1888	.37*
NBR	f		633		429	
SBL	0	0	0		0	
SBT	3	5100	1103	.22*	1039	.20
SBR	f		979		672	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	732	.22*	534	.16*
WBT	0	0	0		0	
WBR	1	1700	438	.26	770	.45
Right Turn Adjustment					WBR	.29*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.49		.87

233 . Culver Drive at I-405 SB Ramps

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	994	.19	1426	.28*
NBR	f		257		550	
SBL	0	0	0		0	
SBT	3	5100	1544	.30*	1184	.23
SBR	f		251		306	
EBL	1.5		316	{.17}*	928	.27*
EBT	0	5100	0	.17	0	
EBR	1.5		551		526	{.27}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .60

234 . Culver Drive at Michaelson Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	113	.03*	275	.08
NBT	3	5100	800	.16	1498	.31*
NBR	0	0	10		71	
SBL	2	3400	171	.05	570	.17*
SBT	3	5100	1549	.30*	733	.14
SBR	1	1700	377	.22	386	.23
EBL	2	3400	341	.10	331	.10
EBT	1	1700	158	.09*	191	.11*
EBR	1	1700	183	.11	182	.11
WBL	1	1700	88	.05*	170	.10*
WBT	2	3400	94	.03	196	.06
WBR	1	1700	213	.13	316	.19
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .74

235 . Culver Drive at University Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	7	.00	51	.03
NBT	3	5100	1272	.25	1462	.29*
NBR	d	1700	200	.12	813	.48
SBL	1	1700	17	.01	27	.02*
SBT	3	5100	1218	.29*	1029	.25
SBR	0	0	271		254	
EBL	2	3400	45	.01	268	.08
EBT	3	5100	319	.07*	720	.14*
EBR	0	0	13		16	
WBL	2	3400	437	.13*	490	.14*
WBT	3	5100	750	.15	424	.09
WBR	0	0	21		36	
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .72

337 . Von Karman at Quartz

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	431	.25*	206	.12*
NBT	2	3400	1005	.30	1233	.36
NBR	1	1700	199	.12	60	.04
SBL	1	1700	158	.09	77	.05
SBT	2	3400	936	.28*	1238	.36*
SBR	d	1700	267	.16	120	.07
EBL	2	3400	39	.01*	199	.06*
EBT	1	1700	6	.00	7	.00
EBR	1	1700	66	.04	455	.27
WBL	1	1700	39	.02	62	.04
WBT	1	1700	21	.01*	13	.01*
WBR	f		50		168	
Right Turn Adjustment					EBR	.15*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .75

439 . Bixby at Michelson Drive

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	15	.01*	40	.02*
NBT	1	1700	3	.00	2	.01
NBR	0	0	5		21	
SBL	2	3400	22	.01	87	.03
SBT	1	1700	5	.03*	3	.13*
SBR	0	0	41		217	
EBL	1	1700	258	.15*	97	.06*
EBT	2	3400	384	.12	657	.20
EBR	0	0	38		34	
WBL	1	1700	34	.02	61	.04
WBT	2	3400	554	.16*	888	.26*
WBR	1	1700	54	.03	29	.02
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .40 .52

440 . Siglo at Main Street

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	135	.04*	273	.08*
SBT	0	0	0		0	
SBR	1	1700	166	.10	112	.07
EBL	2	3400	52	.02*	135	.04
EBT	3	5100	526	.10	2254	.44*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5100	1785	.35*	997	.20
WBR	1	1700	233	.14	158	.09
Right Turn Adjustment			SBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .50 .57

472 . Obsidian at Michelson

2008 WITH PROJECT (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	4		5	
NBT	1	1700	1	.02*	1	.04*
NBR	0	0	26		56	
SBL	0	0	12	{.01}*	119	{.07}*
SBT	1	1700	1	.01	1	.07
SBR	f		19		86	
EBL	1	1700	109	.06*	55	.03*
EBT	2	3400	369	.11	733	.22
EBR	0	0	10		6	
WBL	1	1700	99	.06	34	.02
WBT	2	3400	1293	.38*	794	.23*
WBR	f		149		53	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .42

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\wProj\EXE-193\ICU\Y08WP-NPB01-102809

61 . Airport Way at Campus Drive

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	25	{.02}*	2	
SBT	0	0	0		0	
SBR	2	3200	245	.08	379	.12
EBL	1	1600	227	.14*	307	.19*
EBT	3	4800	1215	.25	877	.18
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	670	.18*	1556	.36*
WBR	0	0	179		188	
Right Turn Adjustment			SBR	.06*	SBR	.12*
TOTAL CAPACITY UTILIZATION			.40		.67	

62 . Campus Drive at Bristol Street NB

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	633	.20	811	.25*
NBT	3	4800	1987	.41*	698	.15
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6400	354	.06	911	.14*
SBR	2	3200	339	.11	1032	.32
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	203	.13	284	.18
WBT	4	6400	1031	.20*	2045	.33*
WBR	0	0	230		77	
Right Turn Adjustment					SBR	.18*
TOTAL CAPACITY UTILIZATION			.61		.90	

63 . Campus Drive at Bristol Street SB

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	5	8000	1264	.18*	858	.13*
NBR	0	0	212		257	.16
SBL	1	1600	152	.10*	210	.13*
SBT	3	4800	394	.08	995	.21
SBR	0	0	0		0	
EBL	1.5		1362	{.46}*	552	{.23}*
EBT	2.5	6400	1570	.46	929	.23
EBR	2	3200	454	.14	506	.16
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.03*
TOTAL CAPACITY UTILIZATION			.74		.52	

64 . Birch Street at Bristol NB

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	133	.04	167	.05*
NBT	2	3200	1069	.33*	383	.12
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	1.5	6400	173	.05	618	.26*
SBR	2.5		122	.04	1037	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		454		530	
WBT	3.5	8000	1214	.26*	1325	.25*
WBR	0		440	.28	148	
Right Turn Adjustment			WBR	.02*		
TOTAL CAPACITY UTILIZATION			.61		.56	

65 . Birch Street at Bristol SB

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2.5	6400	347	.09*	329	.10
NBR	1.5		251		322	
SBL	2	3200	200	.06*	343	.11
SBT	2	3200	354	.11	815	.25*
SBR	0	0	0		0	
EBL	1.5		637	{.21}*	178	
EBT	3	8000	867	.21	1134	.18*
EBR	0.5		191		118	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .36 .43

84 . MacArthur Boulevard at Campus Drive

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	56	.04	109	.07
NBT	4	6400	951	.15*	988	.15*
NBR	1	1600	90	.06	74	.05
SBL	1	1600	261	.16*	220	.14*
SBT	4	6400	1068	.17	1062	.17
SBR	1	1600	252	.16	703	.44
EBL	2	3200	377	.12*	321	.10*
EBT	3	4800	821	.17	625	.13
EBR	d	1600	93	.06	83	.05
WBL	2	3200	72	.02	102	.03
WBT	3	4800	598	.12*	1214	.25*
WBR	f		199		165	
Right Turn Adjustment					SBR	.22*

TOTAL CAPACITY UTILIZATION .55 .86

85 . MacArthur Bloulevard at Birch

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	47	.03	113	.07*
NBT	3	4800	1741	.36*	1183	.25
NBR	f		104		22	
SBL	1	1600	146	.09*	70	.04
SBT	4	6400	827	.16	2139	.36*
SBR	0	0	177		170	
EBL	1.5		123	.08*	297	{.12}*
EBT	1.5	4800	407	.15	269	.12
EBR	0		59		24	
WBL	1	1600	21	.01	103	.06
WBT	2	3200	298	.09*	817	.26*
WBR	f		60		140	

TOTAL CAPACITY UTILIZATION .62 .81

105 . Von Karman Avenue at Campus Drive

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	17	.01	89	.06*
NBT	2	3200	681	.21*	599	.19
NBR	f		57		151	
SBL	1	1600	49	.03*	234	.15
SBT	2	3200	580	.22	980	.39*
SBR	0	0	126		263	
EBL	1	1600	250	.16*	223	.14*
EBT	2	3200	564	.18	631	.20
EBR	f		47		53	
WBL	1	1600	91	.06	103	.06
WBT	2	3200	441	.18*	897	.31*
WBR	0	0	141		87	

TOTAL CAPACITY UTILIZATION .58 .90

106 . Von Karman Avenue at Birch Street

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	26	.02	68	.04*
NBT	2	3200	539	.19*	606	.22
NBR	0	0	68		99	
SBL	1	1600	59	.04*	34	.02
SBT	2	3200	402	.19	620	.26*
SBR	0	0	198		223	
EBL	1	1600	90	.06*	126	.08*
EBT	2	3200	230	.09	213	.08
EBR	0	0	47		47	
WBL	1	1600	53	.03	22	.01
WBT	2	3200	309	.10*	418	.15*
WBR	0	0	25		52	

TOTAL CAPACITY UTILIZATION .39 .53

107 . Von Karman Avenue at MacArthur Boulevard

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	30	.02*	135	.08
NBT	2	3200	115	.04	277	.09*
NBR	f		25		180	
SBL	2	3200	173	.05	677	.21*
SBT	1	1600	168	.11*	117	.07
SBR	f		26		65	
EBL	1	1600	58	.04*	41	.03
EBT	3	4800	358	.07	883	.18*
EBR	f		164		51	
WBL	1	1600	96	.06	43	.03*
WBT	3	4800	904	.19*	583	.12
WBR	f		703		162	

TOTAL CAPACITY UTILIZATION .36 .51

121 . Teller Avenue at Campus Drive

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	5	.00	35	.02*
NBT	1	1600	61	.04	107	.07
NBR	1	1600	16	.01	71	.04
SBL	1	1600	54	.03	122	.08
SBT	1	1600	138	.12*	168	.20*
SBR	0	0	58		145	
EBL	1	1600	115	.07*	70	.04
EBT	2	3200	459	.14	870	.27*
EBR	f		34		18	
WBL	1	1600	58	.04	36	.02*
WBT	2	3200	563	.23*	548	.20
WBR	0	0	188		92	

TOTAL CAPACITY UTILIZATION .42 .51

147 . Jamboree Road at Campus Drive

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	173	.05*	99	.03
NBT	4	6400	1304	.22	1898	.36*
NBR	0	0	97		382	
SBL	2	3200	328	.10	334	.10*
SBT	3	4800	1770	.41*	1705	.40
SBR	0	0	181		228	
EBL	2	3200	190	.06	427	.13*
EBT	2	3200	332	.10*	509	.16
EBR	f		56		240	
WBL	2	3200	450	.14*	185	.06
WBT	2	3200	430	.13	441	.14*
WBR	1	1600	177	.11	246	.15
Right Turn Adjustment					WBR	.01*

TOTAL CAPACITY UTILIZATION .70 .74

148 . Jamboree Road at Birch Street

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	141	.09*	147	.09*
NBT	3	4800	1467	.31	1836	.38
NBR	0	0	1		1	
SBL	1	1600	5	.00	1	.00
SBT	3	4800	1844	.38*	1892	.39*
SBR	f		429		184	
EBL	1.5		122	{.04}*	384	{.12}*
EBT	0.5	3200	2	.04	0	.12
EBR	f		24		128	
WBL	0	0	1		1	
WBT	1	1600	2	.00*	1	.00*
WBR	0	0	2		2	

TOTAL CAPACITY UTILIZATION .51 .60

149 . Jamboree Road at Fairchild Road

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	8	.01	9	.01
NBT	3	4800	1731	.37*	1811	.38*
NBR	0	0	47		19	
SBL	2	3200	316	.10*	306	.10*
SBT	4	6400	1724	.27	1822	.28
SBR	d	1600	9	.01	2	.00
EBL	1	1600	1	.00	16	.01
EBT	1	1600	0	.00	7	.10*
EBR	0	0	3		157	
WBL	1	1600	6	.00	14	.01*
WBT	1	1600	2	.00*	6	.00
WBR	1	1600	302	.19	291	.18
Right Turn Adjustment			WBR	.19*	WBR	.08*

TOTAL CAPACITY UTILIZATION .66 .67

150 . Jamboree Road at MacArthur Boulevard

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	521	.16*	226	.07
NBT	3	4800	1114	.23	1120	.23*
NBR	1	1600	233	.15	48	.03
SBL	2	3200	379	.12	592	.19*
SBT	3	4800	1008	.21*	1294	.27
SBR	1	1600	258	.16	117	.07
EBL	2	3200	92	.03*	193	.06
EBT	3	4800	390	.08	1219	.25*
EBR	f		178		297	
WBL	2	3200	190	.06	283	.09*
WBT	3	4800	1577	.33*	582	.12
WBR	1	1600	611	.38	434	.27
Right Turn Adjustment			WBR	.05*		

TOTAL CAPACITY UTILIZATION .78 .76

151 . Jamboree Road at Bristol Street NB

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	863	.27	741	.23
NBT	1.5	4800	1700	.53*	2167	.68*
NBR	1.5		0		0	
SBL	0	0	0		0	
SBT	2.5	6400	691	.17	1227	.31
SBR	1.5		400		733	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .53 .68

153 . Jamboree Road at Bristol Street SB

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	5	8000	1992	.26*	1937	.25*
NBR	0	0	53		92	
SBL	0	0	2		1	
SBT	3	4800	749	.16	1149	.24
SBR	0	0	0		0	
EBL	1.5		1078	.34*	1066	{.40}*
EBT	1.5	4800	342	.21	848	.40
EBR	2	3200	1123	.35	1153	.36
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.01*		

TOTAL CAPACITY UTILIZATION .61 .65

154 . Jamboree Road at Eastbluff Drive

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	71	.04	38	.02*
NBT	3	4800	1457	.30*	1426	.30
NBR	1	1600	203	.13	254	.16
SBL	2	3200	64	.02*	190	.06
SBT	3	4800	1347	.28	1905	.40*
SBR	1	1600	340	.21	434	.27
EBL	1.5		398	{.17}*	235	{.11}*
EBT	0.5	3200	108	.17	104	.11
EBR	0		34		26	
WBL	1.5		295		224	
WBT	1.5	4800	158	.09*	150	.08*
WBR	f		200		100	

TOTAL CAPACITY UTILIZATION .58 .61

155 . Jamboree Road at Bison Avenue

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	1346	.28	1695	.35
NBR	d	1600	201	.13	141	.09
SBL	2	3200	202	.06	181	.06
SBT	3	4800	1634	.34*	2044	.43*
SBR	1	1600	196	.12	118	.07
EBL	1	1600	117	.07*	67	.04
EBT	0	0	0		0	
EBR	1	1600	71	.04	35	.02
WBL	2	3200	144	.05	273	.09*
WBT	0	0	0		0	
WBR	2	3200	179	.06	195	.06
Right Turn Adjustment			Multi	.08*	Multi	.03*

TOTAL CAPACITY UTILIZATION .49 .55

156 . Jamboree Road at Ford Road

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	364	.11*	362	.11*
NBT	3	4800	1301	.29	1813	.42
NBR	0	0	98		208	
SBL	1	1600	61	.04	44	.03
SBT	3	4800	1561	.33*	2171	.45*
SBR	1	1600	167	.10	49	.03
EBL	1.5		232	{.10}*	66	.04
EBT	1.5	4800	239	.10	212	.07*
EBR	1	1600	271	.17	255	.16
WBL	1.5		136	.09	181	{.07}*
WBT	1.5	4800	358	.11*	157	.07
WBR	1	1600	33	.02	35	.02
Right Turn Adjustment			EBR	.05*	EBR	.09*

TOTAL CAPACITY UTILIZATION .70 .79

176 . Fairchild Avenue at MacArthur Boulevard

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	29	.02*	414	.26*
SBT	0	0	0		0	
SBR	1	1600	21	.01	182	.11
EBL	1	1600	274	.17*	35	.02
EBT	3	4800	729	.15	1767	.37*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	2290	.59*	1146	.26
WBR	0	0	552		93	

TOTAL CAPACITY UTILIZATION .78 .63

178 . MacArthur Boulevard at Bison Avenue

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	197	.06	192	.06*
NBT	4	6400	2501	.39*	2479	.39
NBR	1	1600	154	.10	183	.11
SBL	2	3200	84	.03*	233	.07
SBT	4	6400	2057	.32	2736	.43*
SBR	1	1600	263	.16	321	.20
EBL	2	3200	224	.07	192	.06
EBT	2	3200	224	.07*	191	.06*
EBR	f		162		214	
WBL	2	3200	383	.12*	363	.11*
WBT	2	3200	217	.07	266	.08
WBR	1	1600	97	.06	145	.09

TOTAL CAPACITY UTILIZATION .61 .66

179 . MacArthur Boulevard at Ford Road

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	107	.03	61	.02
NBT	4	6400	1928	.30*	2370	.37*
NBR	f		86		479	
SBL	2	3200	529	.17*	774	.24*
SBT	4	6400	1969	.31	2344	.37
SBR	f		13		50	
EBL	2	3200	39	.01	27	.01
EBT	2	3200	266	.08*	299	.09*
EBR	1	1600	121	.08	61	.04
WBL	2	3200	552	.17*	233	.07*
WBT	2	3200	323	.10	280	.09
WBR	f		910		480	

TOTAL CAPACITY UTILIZATION .72 .77

194 . MacArthur Boulevard SB at University Drive

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	35	.02*	67	.04*
NBT	0	0	0		0	
NBR	1	1600	260	.16	117	.07
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	970	.22*	1000	.22*
EBR	0	0	64		46	
WBL	2	3200	104	.03*	259	.08*
WBT	3	4800	857	.18	732	.15
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.14*	NBR	.03*

TOTAL CAPACITY UTILIZATION .41 .37

195 . SR-73 SB Ramps at University Drive

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	626	.39*	542	.34*
SBT	0	0	0		0	
SBR	1	1600	73	.05	179	.11
EBL	0	0	0		0	
EBT	3	4800	418	.09	620	.13*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	522	.11*	523	.11
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .50 .47

733 . Irvine at Mesa Drive

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	58	.04	49	.03*
NBT	2	3200	881	.28*	604	.19
NBR	d	1600	276	.17	174	.11
SBL	1	1600	13	.01*	11	.01
SBT	2	3200	495	.15	1273	.40*
SBR	d	1600	34	.02	176	.11
EBL	1	1600	99	.06	37	.02
EBT	1	1600	188	.16*	94	.13*
EBR	0	0	66		110	
WBL	1	1600	153	.10*	444	.28*
WBT	1	1600	57	.04	432	.27
WBR	1	1600	8	.01	24	.02

TOTAL CAPACITY UTILIZATION .55 .84

734 . Irvine at University/Del Mar

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	102	.06	118	.07*
NBT	2	3200	1153	.36*	735	.23
NBR	1	1600	1	.00	23	.01
SBL	1	1600	96	.06*	40	.03
SBT	2	3200	568	.18	1605	.50*
SBR	1	1600	71	.04	124	.08
EBL	1	1600	163	.10*	87	.05*
EBT	1	1600	46	.03	32	.02
EBR	1	1600	114	.07	133	.08
WBL	1	1600	17	.01	48	.03
WBT	1	1600	13	.01*	31	.02*
WBR	d	1600	20	.01	34	.02
Right Turn Adjustment					EBR	.04*

TOTAL CAPACITY UTILIZATION .53 .68

741 . Jamboree Road at San Joaquin

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	41	.03	67	.04
NBT	3	4800	1143	.24*	1623	.34*
NBR	f		129		136	
SBL	2	3200	667	.21*	455	.14*
SBT	3	4800	1247	.26	1874	.39
SBR	1	1600	38	.02	118	.07
EBL	1.5		258	.08*	162	.05
EBT	1.5	4800	33	.02	34	.02*
EBR	f		59		57	
WBL	1.5		128	.04	189	.06*
WBT	1.5	4800	12	.01*	39	.02
WBR	1	1600	47	.03	67	.04
Right Turn Adjustment			WBR	.02*	WBR	.01*

TOTAL CAPACITY UTILIZATION .56 .57

742 . MacArthur Boulevard at San Joaquin

2008 WITH PROJECT (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	133	.04*	111	.03
NBT	3	4800	1333	.28	1903	.40*
NBR	1	1600	192	.12	26	.02
SBL	2	3200	272	.09	512	.16*
SBT	3	4800	1764	.37*	1882	.39
SBR	f		524		251	
EBL	2	3200	449	.14*	554	.17*
EBT	3	4800	105	.03	348	.11
EBR	0	0	37		163	
WBL	1	1600	9	.01	47	.03
WBT	2	3200	322	.10*	306	.10*
WBR	f		425		532	

TOTAL CAPACITY UTILIZATION .65 .83

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\wProj\EXE-193\ICU\Y08WP-SAN01-102809

4 . SR-55 SB Ramps at Edinger Avenue

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		449	{.15}*	321	{.11}*
NBT	0.5	3400	67	.15	62	.11
NBR	f		429		213	
SBL	1	1700	63	.04	129	.08
SBT	1	1700	33	.04*	95	.09*
SBR	0	0	34		53	
EBL	1	1700	41	.02	55	.03
EBT	2	3400	918	.27*	1116	.33*
EBR	f		234		262	
WBL	1	1700	334	.20*	290	.17*
WBT	2	3400	1020	.32	750	.24
WBR	0	0	79		71	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .71 .75

5 . Hotel Terrace Drive at Dyer Road

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		183	{.06}*	177	{.06}*
NBT	0.5	3400	14	.06	15	.06
NBR	2	3400	337	.10	83	.02
SBL	0.5		81		88	
SBT	1.5	3400	185	.08*	493	.17*
SBR	1	1700	36	.02	130	.08
EBL	1	1700	64	.04	129	.08
EBT	3	5100	952	.19*	937	.18*
EBR	1	1700	336	.20	147	.09
WBL	2	3400	451	.13*	576	.17*
WBT	3	5100	874	.17	912	.18
WBR	1	1700	178	.10	49	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .51 .63

6 . Grand Avenue at Dyer Road

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	516	.15*	741	.22*
SBT	0	0	0		0	
SBR	1	1700	412	.24	312	.18
EBL	1	1700	171	.10*	314	.18*
EBT	3	5100	1200	.24	882	.17
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	1103	.32*	1295	.38*
WBR	f		719		473	
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .63 .83

7 . SR-55 NB Ramps at Dyer Road

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		815	{.30}*	219	.06*
NBT	0	5100	0	.30	0	
NBR	1.5		714		88	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1944	.38*	1109	.22
EBR	f		551		1023	
WBL	0	0	0		0	
WBT	2.5	5100	1053	.28	1653	.49*
WBR	0.5		395		1211	.71
Right Turn Adjustment					WBR	.17*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .73 .77

8 . SR-55 SB Ramps at MacArthur Boulevard

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	993	.29*	355	.10*
SBT	0	0	0		0	
SBR	2	3400	905	.27	739	.22
EBL	0	0	0		0	
EBT	2	3400	1337	.39*	1246	.37*
EBR	f		698		947	
WBL	0	0	0		0	
WBT	3	5100	1282	.25	1768	.35
WBR	f		139		672	
Right Turn Adjustment					SBR	.10*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .73 .62

9 . SR-55 NB Ramps at MacArthur Boulevard

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	987	.29*	656	.19*
NBT	0	0	0		0	
NBR	f		727		288	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	1529	.45*	933	.27
EBR	f		606		741	
WBL	0	0	0		0	
WBT	3	5100	666	.13	1719	.34*
WBR	f		276		1148	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .79 .58

28 . Pullman Street at Warner Avenue

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		55		145	{.09}*
NBT	0.5	1700	22	.05*	4	.09
NBR	1	1700	65	.04	90	.05
SBL	0	0	7		54	
SBT	2	3400	8	.01	34	.04*
SBR	0	0	2		66	.04
EBL	1	1700	46	.03	9	.01*
EBT	3	5100	815	.20*	745	.16
EBR	0	0	193		53	
WBL	1	1700	51	.03*	63	.04
WBT	3	5100	556	.12	1056	.21*
WBR	0	0	34		7	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .33 .40

29 . Pullman Street at Barranca Parkway

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	201	.06*	687	.20*
NBT	1	1700	23	.03	17	.05
NBR	0	0	31		73	
SBL	1	1700	40	.02	28	.02
SBT	0.5	3400	36	{.02}*	14	{.08}*
SBR	1.5		97		377	
EBL	1	1700	264	.16*	158	.09*
EBT	3	5100	1202	.32	943	.21
EBR	0	0	432		121	
WBL	1	1700	47	.03	52	.03
WBT	3	5100	987	.20*	1680	.33*
WBR	0	0	20		24	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .49 .75

543 . Bristol at Segerstrom

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	55	.03*	154	.09
NBT	3	5100	716	.14	1269	.25*
NBR	d	1700	162	.10	262	.15
SBL	1	1700	202	.12	152	.09*
SBT	3	5100	1115	.23*	924	.20
SBR	0	0	76		91	
EBL	1	1700	174	.10	207	.12*
EBT	2	3400	708	.23*	649	.25
EBR	0	0	65		201	
WBL	1	1700	148	.09*	197	.12
WBT	2	3400	477	.16	731	.25*
WBR	0	0	71		102	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.63		.76

544 . Bristol at MacArthur Boulevard

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	92	.03*	427	.13*
NBT	3	5100	548	.11	1336	.26
NBR	1	1700	109	.06	317	.19
SBL	2	3400	226	.07	252	.07
SBT	3	5100	1081	.24*	958	.22*
SBR	0	0	134		158	
EBL	2	3400	172	.05	327	.10*
EBT	3	5100	1288	.25*	800	.16
EBR	1	1700	143	.08	155	.09
WBL	2	3400	162	.05*	359	.11
WBT	3	5100	1044	.20	1480	.29*
WBR	1	1700	150	.09	268	.16
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.62		.79

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\wProj\EXE-193\ICU\Y08WP-SAN02-102809

719 . Flower at Segerstrom

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	88	.05	78	.05*
NBT	2	3400	536	.18*	360	.14
NBR	0	0	80		107	
SBL	1	1700	77	.05*	142	.08
SBT	2	3400	378	.13	702	.23*
SBR	0	0	57		72	
EBL	1	1700	93	.05	92	.05*
EBT	2	3400	800	.31*	607	.21
EBR	0	0	262		108	
WBL	1	1700	67	.04*	43	.03
WBT	2	3400	551	.17	856	.28*
WBR	0	0	43		80	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.63		.66

720 . Flower at MacArthur Boulevard

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	21	.01*	45	.03
NBT	2	3400	134	.06	526	.18*
NBR	0	0	60		87	
SBL	1	1700	137	.08	82	.05*
SBT	2	3400	265	.15*	166	.08
SBR	0	0	247		108	
EBL	1	1700	181	.11	159	.09*
EBT	3	5100	1343	.27*	1018	.21
EBR	0	0	40		47	
WBL	1	1700	50	.03*	73	.04
WBT	3	5100	720	.16	1937	.41*
WBR	0	0	98		162	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.51		.78

723 . Main Street at Segerstrom

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	57	.03	140	.08
NBT	2	3400	452	.13*	1004	.30*
NBR	1	1700	169	.10	321	.19
SBL	1	1700	195	.11*	92	.05*
SBT	3	5100	949	.21	602	.15
SBR	0	0	142		149	
EBL	1	1700	164	.10	121	.07*
EBT	2	3400	859	.25*	510	.15
EBR	1	1700	151	.09	56	.03
WBL	1	1700	130	.08*	145	.09
WBT	2	3400	696	.20	768	.23*
WBR	1	1700	91	.05	132	.08
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.62		.70

724 . Main Street at Alton Avenue

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	12	.01*	28	.02
NBT	3	5100	691	.14	1391	.28*
NBR	0	0	42		38	
SBL	1	1700	81	.05	58	.03*
SBT	3	5100	1114	.22*	680	.14
SBR	0	0	7		29	
EBL	0	0	8		10	{.01}*
EBT	0	0	2		2	
EBR	0	0	25		16	
WBL	0.5		48		60	
WBT	0.5	1700	2	.03*	1	.04*
WBR	1	1700	35	.02	73	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.31		.41

725 . Main Street and MacArthur (w/o SR-55)

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	44	.01	341	.10
NBT	3	5100	296	.06*	700	.14*
NBR	1	1700	191	.11	388	.23
SBL	2	3400	387	.11*	239	.07*
SBT	3	5100	647	.13	442	.09
SBR	1	1700	135	.08	295	.17
EBL	2	3400	266	.08	280	.08*
EBT	3	5100	1631	.32*	718	.14
EBR	1	1700	170	.10	55	.03
WBL	2	3400	293	.09*	223	.07
WBT	3	5100	800	.16	1422	.28*
WBR	1	1700	313	.18	397	.23
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .63 .62

727 . Halladay Street at Dyer Road

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	4	.00	27	.02
NBT	1	1700	12	.05*	79	.16*
NBR	0	0	69		193	
SBL	1	1700	237	.14*	153	.09*
SBT	1	1700	33	.06	30	.05
SBR	0	0	68		56	
EBL	1	1700	72	.04	134	.08*
EBT	3	5100	1088	.21*	1030	.20
EBR	0	0	7		5	
WBL	1	1700	169	.10*	88	.05
WBT	3	5100	673	.16	1032	.22*
WBR	0	0	148		113	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .60

728 . Halladay Street East at Alton Parkway

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0.5		31		43	
SBT	0	1700	0	.13*	0	.07*
SBR	0.5		191		78	
EBL	1	1700	52	.03*	239	.14*
EBT	1	1700	53	.03	38	.02
EBR	0	0	0		0	
WBL	1	1700	0	.00	0	.00
WBT	1	1700	19	.01*	54	.03*
WBR	1	1700	33	.02	58	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .22 .29

729 . Halladay Street West at Alton Parkway

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		1		24	
NBT	0.5	1700	0	.02*	0	.11*
NBR	0		27		171	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	1	1700	79	.06*	99	.06*
EBR	0	0	28		4	
WBL	0.5		143	{.08}*	46	{.03}*
WBT	0.5	1700	66	.12	93	.08
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .21 .25

730 . Grand Avenue at Warner Avenue

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	178	.10*	269	.16*
NBT	3	5100	628	.16	723	.16
NBR	0	0	191		92	
SBL	1	1700	157	.09	167	.10
SBT	3	5100	567	.15*	593	.17*
SBR	0	0	212		279	
EBL	2	3400	329	.10*	365	.11*
EBT	3	5100	750	.15	454	.09
EBR	1	1700	230	.14	160	.09
WBL	2	3400	75	.02	151	.04
WBT	2	3400	385	.11*	787	.23*
WBR	1	1700	82	.05	256	.15
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.51		.72

731 . Grand Avenue at SR-55 SB Ramps

2008 WITH PROJECT (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	883	.26*	790	.23*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	623	.12	733	.14
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	352	.21*	328	.19*
WBT	0	0	0		0	
WBR	1	1700	367	.22	245	.14
Right Turn Adjustment			WBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.53		.47

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\wProj\EXE-193\ICU\Y08WP-TUS01-102809

3 . Newport Avenue at Edinger Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	365	.11*	220	.06*
NBT	0	0	0		0	
NBR	1	1700	31	.02	15	.01
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	658	.13*	979	.19*
EBR	1	1700	775	.46	663	.39
WBL	1	1700	174	.10*	130	.08*
WBT	3	5100	1139	.22	1024	.20
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.22*	EBR	.14*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .61 .52

14 . Walnut Avenue to McFadden Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	299	.09*	491	.14*
NBT	0	0	3		6	
NBR	1	1700	7	.00	51	.03
SBL	0	0	0		0	
SBT	0	0	5		2	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	385	.19	582	.26*
EBR	0	0	246		287	
WBL	1	1700	16	.01	19	.01*
WBT	2	3400	826	.24*	465	.14
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .38 .46

18 . Newport Avenue at Bryan Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	57	.03*	109	.06
NBT	2	3400	492	.14	977	.29*
NBR	d	1700	11	.01	25	.01
SBL	1	1700	64	.04	134	.08*
SBT	2	3400	1378	.41*	989	.29
SBR	d	1700	55	.03	36	.02
EBL	1	1700	18	.01*	50	.03*
EBT	1	1700	27	.02	68	.04
EBR	1	1700	61	.04	166	.10
WBL	1	1700	21	.01	43	.03
WBT	1	1700	62	.04*	82	.05*
WBR	1	1700	232	.14	398	.23
Right Turn Adjustment					WBR	.12*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .62

19 . Newport Avenue at Main Street

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	84	.05	139	.08*
NBT	2	3400	355	.10*	936	.28
NBR	d	1700	40	.02	87	.05
SBL	1	1700	35	.02*	76	.04
SBT	2	3400	104	.03	888	.26*
SBR	1	1700	62	.04	131	.08
EBL	1	1700	38	.02	111	.07*
EBT	2	3400	91	.03*	227	.07
EBR	1	1700	103	.06	139	.08
WBL	1	1700	145	.09*	172	.10
WBT	2	3400	167	.05	435	.13*
WBR	1	1700	7	.00	26	.02
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .29 .59

20 . Newport Avenue at El Camino Real

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	198	.12*	199	.12
NBT	2	3400	586	.17	819	.24*
NBR	d	1700	132	.08	169	.10
SBL	1	1700	84	.05	189	.11*
SBT	3	5100	1255	.25*	823	.17
SBR	0	0	17		69	
EBL	1	1700	8	.00	37	.02
EBT	1	1700	109	.06*	261	.15*
EBR	1	1700	263	.15	223	.13
WBL	1	1700	164	.10*	197	.12*
WBT	2	3400	200	.08	348	.13
WBR	0	0	63		101	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .67

21 . Newport Avenue at I-5 NB Ramps

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	234	.14*	311	.18*
NBT	2	3400	1024	.30	1533	.45
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	2	3400	1376	.40*	1030	.30*
SBR	1	1700	411	.24	434	.26
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .53

22 . Newport Avenue at I-5 SB Ramps

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	864	.25*	1207	.36*
NBR	1	1700	66	.04	64	.04
SBL	1	1700	182	.11*	230	.14*
SBT	2	3400	1121	.33	883	.26
SBR	0	0	0		0	
EBL	1.5		379		415	
EBT	0.5	3400	79	.13*	62	.14*
EBR	1	1700	334	.20	531	.31
WBL	1	1700	30	.02*	67	.04*
WBT	0	0	0		0	
WBR	1	1700	119	.07	190	.11
Right Turn Adjustment			EBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .73

23 . Newport Avenue at McFadden Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	28	.02*	43	.03*
NBT	3	5100	527	.11	648	.13
NBR	0	0	11		15	
SBL	1	1700	18	.01	38	.02
SBT	3	5100	797	.23*	685	.20*
SBR	0	0	932	.55	416	.24
EBL	2	3400	339	.10*	527	.16*
EBT	0	0	1		9	
EBR	1	1700	37	.02	33	.02
WBL	0	0	0		0	
WBT	1	1700	0	.01*	0	.02*
WBR	0	0	19		28	
Right Turn Adjustment			SBR	.24*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .46

24 . Newport Avenue at Walnut Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	24	.01	60	.04
NBT	2	3400	438	.13*	390	.11*
NBR	d	1700	97	.06	68	.04
SBL	1	1700	568	.33*	480	.28*
SBT	2	3400	292	.09	403	.12
SBR	d	1700	19	.01	43	.03
EBL	1	1700	34	.02*	19	.01*
EBT	2	3400	197	.07	249	.08
EBR	0	0	27		36	
WBL	1	1700	79	.05	121	.07
WBT	2	3400	272	.16*	442	.26*
WBR	0	0	335	.20	500	.29
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .71

25 . Newport Avenue at Sycamore Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	129	.08	41	.02
NBT	1	1700	98	.06*	63	.04*
NBR	d	1700	69	.04	26	.02
SBL	1	1700	214	.13*	236	.14*
SBT	1	1700	70	.04	141	.08
SBR	1	1700	103	.06	86	.05
EBL	1	1700	159	.09*	115	.07*
EBT	1	1700	65	.04	60	.05
EBR	0	0	11		24	
WBL	0.5		27		55	
WBT	1.5	3400	262	.12*	334	.16*
WBR	0		134		168	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .46

27 . Del Amo Avenue at Edinger Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		20	{.01}*	62	{.02}*
NBT	0.5	3400	4	.01	0	.02
NBR	1	1700	160	.09	75	.04
SBL	0	0	4		1	
SBT	1	1700	1	.00*	2	.00*
SBR	0	0	3		0	
EBL	1	1700	13	.01*	7	.00
EBT	3	5100	644	.13	909	.18*
EBR	d	1700	32	.02	68	.04
WBL	2	3400	210	.06	185	.05*
WBT	3	5100	1301	.26*	1139	.22
WBR	d	1700	0	.00	0	.00
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .33 .30

35 . Red Hill Avenue at Bryan Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	126	.07*	175	.10
NBT	2	3400	393	.12	790	.23*
NBR	1	1700	145	.09	117	.07
SBL	1	1700	77	.05	117	.07*
SBT	2	3400	827	.24*	447	.13
SBR	1	1700	62	.04	44	.03
EBL	1	1700	39	.02*	37	.02*
EBT	2	3400	317	.12	436	.16
EBR	0	0	81		116	
WBL	1	1700	149	.09	112	.07
WBT	2	3400	532	.20*	605	.22*
WBR	0	0	133		129	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .59

36 . Red Hill Avenue at El Camino Real

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	280	.08*	376	.11
NBT	3	5100	634	.12	816	.16*
NBR	1	1700	167	.10	335	.20
SBL	1	1700	77	.05	260	.15*
SBT	3	5100	1292	.26*	591	.13
SBR	0	0	49		54	
EBL	1	1700	82	.05	29	.02
EBT	1	1700	215	.13*	927	.55*
EBR	1	1700	265	.16	150	.09
WBL	1	1700	298	.18*	349	.21*
WBT	1	1700	195	.14	905	.63
WBR	0	0	43		161	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .70 1.12

37 . Red Hill Avenue at Nisson Road

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	15	.01*	23	.01
NBT	4	6800	840	.13	1491	.22*
NBR	0	0	28		34	
SBL	1	1700	91	.05	138	.08*
SBT	3	5100	1429	.28*	761	.15
SBR	d	1700	72	.04	58	.03
EBL	1	1700	214	.13*	229	.13*
EBT	1	1700	56	.06	125	.10
EBR	0	0	39		41	
WBL	1	1700	34	.02	51	.03
WBT	1	1700	49	.14*	98	.15*
WBR	0	0	197		167	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .64

38 . Red Hill Avenue at Walnut Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	108	.06*	272	.16
NBT	3	5100	425	.12	1666	.38*
NBR	0	0	172		249	
SBL	1	1700	92	.05	151	.09*
SBT	2	3400	1334	.39*	541	.16
SBR	d	1700	91	.05	154	.09
EBL	1	1700	98	.06	136	.08*
EBT	2	3400	310	.17*	313	.12
EBR	0	0	281		87	
WBL	1	1700	276	.16*	223	.13
WBT	2	3400	365	.15	473	.18*
WBR	0	0	150		124	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .83 .78

39 . Red Hill Avenue at Sycamore Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	39	.02*	342	.20
NBT	3	5100	639	.13	1893	.39*
NBR	0	0	36		107	
SBL	1	1700	52	.03	113	.07*
SBT	2	3400	1710	.50*	704	.21
SBR	d	1700	59	.03	133	.08
EBL	1	1700	66	.04*	56	.03*
EBT	1	1700	25	.01	32	.02
EBR	1	1700	139	.08	103	.06
WBL	1	1700	116	.07	51	.03
WBT	1	1700	78	.05*	26	.02*
WBR	1	1700	84	.05	53	.03
Right Turn Adjustment			EBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .70 .56

40 . Red Hill Avenue at Edinger Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	81	.02*	181	.05
NBT	3	5100	337	.07	1793	.35*
NBR	d	1700	101	.06	375	.22
SBL	2	3400	139	.04	151	.04*
SBT	3	5100	1486	.29*	443	.09
SBR	1	1700	318	.19	201	.12
EBL	2	3400	177	.05*	300	.09*
EBT	3	5100	312	.06	643	.13
EBR	1	1700	150	.09	91	.05
WBL	2	3400	565	.17	141	.04
WBT	2	3400	1122	.33*	617	.18*
WBR	1	1700	138	.08	352	.21
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR EBR

TOTAL CAPACITY UTILIZATION .74 .71

41 . Red Hill Avenue at Warner Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	388	.11*	516	.15
NBT	3	5100	390	.08	1761	.35*
NBR	0	0	0		0	
SBL	1	1700	0	.00	0	.00
SBT	3	5100	1533	.39*	512	.15
SBR	0	0	479		253	
EBL	2	3400	206	.06*	347	.10*
EBT	0	0	0		0	
EBR	1	1700	423	.25	390	.23
WBL	0	0	0		0	
WBT	1	1700	0	.00*	0	.00*
WBR	0	0	0		0	
Right Turn Adjustment		EBR	.11*			
Clearance Interval			.05*			.05*

TOTAL CAPACITY UTILIZATION .72 .50

55 . Browning Avenue at Bryan Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	49	.03	43	.03
NBT	2	3400	332	.10*	529	.16*
NBR	d	1700	172	.10	40	.02
SBL	1	1700	64	.04*	48	.03*
SBT	2	3400	98	.03	110	.03
SBR	d	1700	46	.03	34	.02
EBL	1	1700	47	.03	42	.02
EBT	2	3400	530	.16*	1014	.30*
EBR	d	1700	42	.02	69	.04
WBL	1	1700	61	.04*	44	.03*
WBT	2	3400	131	.04	91	.03
WBR	1	1700	104	.06	61	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .39 .57

56 . Browning Avenue at El Camino Real

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	111	.07*	34	.02*
SBT	0	0	0		0	
SBR	1	1700	149	.09	71	.04
EBL	0	0	158	{.09}*	110	{.06}*
EBT	2	3400	143	.09	269	.11
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1700	172	.10*	525	.31*
WBR	1	1700	23	.01	80	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .31 .44

58 . Browning Avenue at Walnut Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	140	.08*	88	.05*
SBT	0	0	0		0	
SBR	1	1700	131	.08	40	.02
EBL	1	1700	111	.07*	56	.03*
EBT	2	3400	626	.18	679	.20
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	600	.21*	933	.37*
WBR	0	0	121		324	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .41 .50

92 . Tustin Ranch Road at Bryan Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	84	.05*	430	.25
NBT	3	5100	489	.10	1686	.33*
NBR	1	1700	60	.04	115	.07
SBL	1	1700	103	.06	74	.04*
SBT	3	5100	1834	.36*	476	.09
SBR	1	1700	83	.05	143	.08
EBL	2	3400	46	.01	110	.03*
EBT	2	3400	258	.08*	602	.18
EBR	1	1700	221	.13	150	.09
WBL	2	3400	244	.07*	132	.04
WBT	2	3400	119	.04	745	.22*
WBR	d	1700	43	.03	135	.08
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR EBR

TOTAL CAPACITY UTILIZATION .61 .67

93 . Tustin Ranch Road at El Camino Real

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	100	.03*	471	.14
NBT	3	5100	448	.09	1933	.38*
NBR	d	1700	122	.07	278	.16
SBL	2	3400	61	.02	112	.03*
SBT	3	5100	2141	.42*	630	.12
SBR	d	1700	96	.06	45	.03
EBL	1	1700	100	.06	55	.03*
EBT	2	3400	121	.07*	224	.10
EBR	0	0	475	.28	132	
WBL	1	1700	236	.14*	223	.13
WBT	2	3400	103	.05	392	.20*
WBR	0	0	58		282	
Right Turn Adjustment			EBR	.19*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .90 .69

94 . Tustin Ranch Road at I-5 NB Ramps

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	313	.09*	621	.18*
NBT	3	5100	953	.19	1198	.23
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1828	.36*	698	.14*
SBR	f		66		496	
EBL	1.5		105	.03*	274	.08*
EBT	0	5100	0		0	
EBR	1.5		137	{.01}	199	{.00}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .45

95 . Tustin Ranch Road at I-5 SB Ramps

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	130	.04*	103	.03
NBT	3	5100	764	.15	1083	.21*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1429	.28*	623	.12
SBR	d	1700	542	.32	280	.16
EBL	1.5		886	{.30}*	764	.22*
EBT	0	5100	0	{.30}	0	
EBR	1.5		687		344	.20
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.67		.48

96 . Tustin Ranch Road at Walnut Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		0		345	
SBT	0	5100	0		0	{.11}*
SBR	1.5		539	.16	463	
EBL	1	1700	436	.26*	325	.19*
EBT	2	3400	564	.17	499	.15
EBR	d	1700	0	.00	0	.00
WBL	0	0	0		0	
WBT	2	3400	475	.14*	456	.13*
WBR	1	1700	596	.35	840	.49
Right Turn Adjustment			WBR	.21*	WBR	.28*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.66		.76

109 . Myford Road at Bryan Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	26	.02*	37	.02
NBT	2	3400	40	.02	133	.05*
NBR	0	0	11		43	
SBL	1	1700	108	.06	38	.02*
SBT	2	3400	127	.06*	58	.03
SBR	0	0	68		44	
EBL	1	1700	31	.02*	54	.03*
EBT	2	3400	339	.10	549	.16
EBR	d	1700	16	.01	37	.02
WBL	1	1700	80	.05	62	.04
WBT	2	3400	803	.24*	744	.22*
WBR	d	1700	44	.03	80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.39		.37

110 . Myford Road at El Camino Real

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	11	.01	4	.00
NBT	2	3400	10	.01*	4	.00*
NBR	0	0	9		12	.01
SBL	1	1700	88	.05*	104	.06*
SBT	1	1700	2	.00	4	.00
SBR	1	1700	112	.07	68	.04
EBL	1	1700	18	.01*	78	.05*
EBT	2	3400	284	.09	563	.17
EBR	0	0	16		10	
WBL	1	1700	6	.00	20	.01
WBT	2	3400	299	.09*	674	.23*
WBR	0	0	23		110	
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.22		.39

111 . Franklin Avenue at Walnut Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	71	.04*	239	.14*
NBT	2	3400	11	.01	12	.01
NBR	0	0	22	.01	18	.01
SBL	1	1700	34	.02	80	.05
SBT	2	3400	9	.01*	9	.01*
SBR	0	0	82	.05	443	.26
EBL	1	1700	390	.23*	166	.10*
EBT	2	3400	962	.28	598	.18
EBR	d	1700	333	.20	79	.05
WBL	1	1700	66	.04	12	.01
WBT	2	3400	387	.11*	1511	.44*
WBR	d	1700	133	.08	72	.04
Right Turn Adjustment					SBR	.17*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.44		.91

453 . Redhill Avenue at Valencia Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	76	.04*	147	.09
NBT	3	5100	501	.10	2134	.43*
NBR	0	0	25		67	
SBL	1	1700	25	.01	29	.02*
SBT	3	5100	1983	.42*	628	.13
SBR	0	0	184		42	
EBL	1	1700	17	.01*	144	.08*
EBT	1	1700	4	.00	17	.01
EBR	1	1700	100	.06	85	.05
WBL	1	1700	55	.03	20	.01
WBT	1	1700	41	.04*	27	.05*
WBR	0	0	35		56	
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.57		.63

478 . Redhill Avenue at I-5 NB Ramps

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	427	.25*	447	.26*
NBT	3	5100	871	.17	1081	.21
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1301	.26*	752	.15*
SBR	1	1700	622	.37	302	.18
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		286		316	
WBT	0.5	3400	2	.08*	36	.10*
WBR	1	1700	250	.15	402	.24
Right Turn Adjustment			SBR	.11*	SBR	.03*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.75		.59

479 . Redhill Avenue at I-5 SB Ramps

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1069	.16*	1111	.16*
NBR	1	1700	604	.36	445	.26
SBL	1	1700	403	.24*	299	.18*
SBT	3	5100	1201	.24	768	.15
SBR	0	0	0		0	
EBL	0.5		226	{.13}*	414	{.24}*
EBT	0.5	1700	0	.13	0	.24
EBR	1	1700	457	.27	325	.19
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			Multi	.22*	NBR	.10*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.80		.73

Source:V:\11986-IBCVision\Recirculated Report\2008ExistingConditions\Traffic Model\wProj\EXE-193\ICU\Y08WP-TUS02-102809

732 . Newport Avenue at SR-55 NB Ramps

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	55	.02*	509	.15*
NBT	3	5100	31	.01	172	.04
NBR	0	0	23	.01	46	
SBL	1	1700	0	.00	11	.01
SBT	2	3400	269	.08*	44	.01*
SBR	1	1700	727	.43	766	.45
EBL	2	3400	372	.11*	114	.03*
EBT	1.5	3400	175	.09	24	.01
EBR	0.5		115		8	
WBL	1	1700	29	.02	23	.01
WBT	2	3400	149	.04*	316	.10*
WBR	0	0	3		17	
Right Turn Adjustment			SBR	.27*	SBR	.42*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .76

739 . Newport Avenue at Mitchell Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	12	.01*	9	.01
NBT	2	3400	758	.22	947	.28*
NBR	d	1700	208	.12	171	.10
SBL	1	1700	126	.07	205	.12*
SBT	2	3400	1410	.41*	988	.29
SBR	d	1700	65	.04	141	.08
EBL	0.5		122	{.07}*	87	{.05}*
EBT	0.5	1700	72	.11	47	.08
EBR	1	1700	14	.01	14	.01
WBL	0.5		144		155	
WBT	0.5	1700	56	.12*	72	.13*
WBR	1	1700	104	.06	169	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .63

740 . Redhill Avenue at Mitchell Avenue

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	35	.02	150	.09
NBT	2	3400	1610	.47*	1326	.39*
NBR	1	1700	93	.05	109	.06
SBL	1	1700	251	.15*	128	.08*
SBT	2	3400	1152	.34	819	.24
SBR	1	1700	156	.09	90	.05
EBL	0.5		41	{.02}*	122	
EBT	0.5	1700	33	.04	102	.13*
EBR	1	1700	31	.02	52	.03
WBL	0.5		21		14	{.01}*
WBT	0.5	1700	31	.03*	93	.06
WBR	1	1700	71	.04	85	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .66

754 . Red Hill Avenue at Carnegie Avenue/A Street

2008 WITH PROJECT (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	112	.07*	35	.02
NBT	3	5100	678	.13	2258	.44*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1390	.30*	902	.18
SBR	0	0	139		16	
EBL	1	1700	11	.01*	121	.07*
EBT	1	1700	0	.01	0	.05
EBR	0	0	17		79	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .43 .56

Appendix B-3 2015 Cumulative Baseline No Project ICU Worksheets

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineNoProj\EXE-193\ICU\Y15NP-COM01-102809

10 . SR-55 Frontage Rd. SB at Paularino Av.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	570		118	
SBT	2	3200	710	.46*	594	.32*
SBR	0	0	201		296	
EBL	0	0	0		0	
EBT	2	3200	865	.31*	462	.18*
EBR	0	0	134		115	
WBL	1	1600	69	.04*	202	.13*
WBT	2	3200	191	.06	684	.21
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .81 .63

11 . SR-55 Frontage Rd. NB at Paularino Av.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	89		121	
NBT	2	3200	649	.23*	684	.25*
NBR	d	1600	132	.08	75	.05
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	1	1600	332	.21	236	.15*
EBT	2	3200	1098	.34*	375	.12
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	171	.11	759	.39*
WBR	0	0	229	.14	500	
Right Turn Adjustment			WBR	.01*		

TOTAL CAPACITY UTILIZATION .58 .79

12 . SR-55 Frontage Rd. SB at Baker St.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	502	{.31}*	203	
SBT	2	3200	118	.23	296	.25*
SBR	0	0	233	.15	451	.28
EBL	0	0	0		0	
EBT	2	3200	1298	.41*	607	.19*
EBR	1	1600	229	.14	433	.27
WBL	1	1600	63	.04*	240	.15*
WBT	2	3200	437	.14	1069	.33
WBR	0	0	0		0	
Right Turn Adjustment					Multi	.10*

TOTAL CAPACITY UTILIZATION .76 .69

13 . SR-55 Frontage Rd. NB at Baker St.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	319		355	
NBT	2	3200	313	.30*	378	.33*
NBR	0	0	338	.21	337	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	1	1600	544	.34*	272	.17*
EBT	2	3200	1217	.38	458	.14
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	253	.08*	1003	.31*
WBR	1	1600	158	.10	396	.25
Right Turn Adjustment			WBR	.02*		

TOTAL CAPACITY UTILIZATION .74 .81

50 . Red Hill Av. at Paularino Av.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	28	.01*	250	.08*
NBT	2	3200	107	.04	710	.23
NBR	0	0	24		19	
SBL	1	1600	80	.05	8	.01
SBT	2	3200	619	.22*	1022	.43*
SBR	0	0	76		338	
EBL	1	1600	97	.06	172	.11*
EBT	2	3200	986	.35*	83	.05
EBR	0	0	166		86	.05
WBL	1	1600	65	.04*	83	.05
WBT	2	3200	356	.12	501	.17*
WBR	0	0	26		48	

TOTAL CAPACITY UTILIZATION .63 .79

51 . Red Hill Av. at Baker St.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	181	.06	339	.11*
NBT	2	3200	778	.27*	619	.20
NBR	0	0	72		14	
SBL	1	1600	34	.02*	12	.01
SBT	2	3200	455	.18	765	.38*
SBR	0	0	111		466	
EBL	1.5		602	{.21}*	485	.15*
EBT	1.5	4800	405	.21	144	.09
EBR	1	1600	312	.20	94	.06
WBL	1	1600	6	.00	81	.05
WBT	2	3200	59	.02*	385	.13*
WBR	0	0	15		46	

TOTAL CAPACITY UTILIZATION .52 .77

52 . Red Hill Av. at Bristol St.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	135	.04	97	.03*
NBT	1.5	4800	384	.12*	156	.05
NBR	1.5		54		26	
SBL	2	3200	207	.06*	429	.13
SBT	2	3200	160	.05	595	.19*
SBR	1	1600	36	.02	267	.17
EBL	2	3200	302	.09*	132	.04*
EBT	3	4800	659	.14	683	.14
EBR	1	1600	65	.04	135	.08
WBL	2	3200	66	.02	137	.04
WBT	2.5	6400	498	{.14}*	1047	.22*
WBR	1.5		483		216	.14

TOTAL CAPACITY UTILIZATION .41 .48

541 . Bear St. at Baker St.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	87	.05	257	.16*
NBT	1	1600	152	.12*	254	.18
NBR	0	0	43		39	
SBL	2	3200	265	.08*	200	.06
SBT	1	1600	215	.13	232	.15*
SBR	2	3200	285	.09	517	.16
EBL	2	3200	486	.15	310	.10*
EBT	2	3200	942	.36*	703	.27
EBR	0	0	202		149	
WBL	1	1600	53	.03*	60	.04
WBT	2	3200	328	.10	1340	.42*
WBR	1	1600	101	.06	138	.09

TOTAL CAPACITY UTILIZATION .59 .83

542 . Bear St. at Paularino Av.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	115	.07*	30	.02
NBT	3	4800	868	.18	1549	.36*
NBR	0	0	11		169	
SBL	1	1600	44	.03	115	.07*
SBT	3	4800	743	.21*	863	.19
SBR	0	0	268		25	
EBL	1	1600	148	.09*	20	.01
EBT	1	1600	15	.04	6	.03*
EBR	0	0	48		43	
WBL	1	1600	9	.01	164	.10*
WBT	1	1600	37	.02*	25	.02
WBR	1	1600	74	.05	201	.13
TOTAL CAPACITY UTILIZATION				.39		.56

545 . Bristol St. at Sunflower Av.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	168	.05*	585	.18
NBT	3	4800	800	.17	1645	.34*
NBR	1	1600	312	.20	180	.11
SBL	2	3200	241	.08	149	.05*
SBT	3	4800	970	.20*	949	.20
SBR	1	1600	108	.07	232	.15
EBL	2	3200	104	.03	334	.10
EBT	2.5	6400	1159	.26*	1151	.24*
EBR	1.5		536		416	{.12}
WBL	2	3200	247	.08*	275	.09*
WBT	3	4800	275	.06	503	.10
WBR	1	1600	178	.11	281	.18
TOTAL CAPACITY UTILIZATION				.59		.72

546 . Bristol St. at Anton Blvd.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	62	.02	481	.15
NBT	4	6400	1168	.18*	2119	.33*
NBR	f		1085		588	
SBL	2	3200	217	.07*	193	.06*
SBT	4	6400	1343	.21	1412	.22
SBR	1	1600	15	.01	51	.03
EBL	1	1600	7	.00	58	.04
EBT	1	1600	18	.01*	39	.02*
EBR	1	1600	5	.00	114	.07
WBL	3	4800	301	.06*	954	.20*
WBT	1	1600	13	.01	98	.06
WBR	1	1600	95	.06	284	.18
TOTAL CAPACITY UTILIZATION				.32		.61

547 . Bristol St. at Paularino Av.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	25	.02	104	.07*
NBT	3	4800	980	.22*	1235	.28
NBR	0	0	81		103	
SBL	2	3200	375	.12*	285	.09
SBT	3	4800	894	.19	1542	.34*
SBR	0	0	22		99	
EBL	1	1600	204	.13	121	.08*
EBT	1	1600	324	.22*	173	.14
EBR	0	0	24		46	
WBL	1	1600	52	.03*	175	.11
WBT	1	1600	124	.08	498	.31*
WBR	1	1600	186	.12	338	.21
TOTAL CAPACITY UTILIZATION				.59		.80

548 . Bristol St. at Baker St.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	74	.02	179	.06
NBT	3	4800	470	.10*	872	.18*
NBR	1	1600	208	.13	158	.10
SBL	2	3200	311	.10*	280	.09*
SBT	3	4800	572	.12	905	.19
SBR	1	1600	120	.08	495	.31
EBL	2	3200	242	.08	263	.08*
EBT	2	3200	961	.32*	491	.19
EBR	0	0	70		106	
WBL	2	3200	158	.05*	269	.08
WBT	2	3200	286	.09	886	.28*
WBR	1	1600	278	.17	435	.27
Right Turn Adjustment					SBR	.04*

TOTAL CAPACITY UTILIZATION .57 .67

549 . Bristol St. at Newport Blvd. SB

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	174	.05*	619	.19*
NBT	3	4800	870	.18	1250	.26
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	750	.16*	720	.15*
SBR	d	1600	316	.20	511	.32
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			SBR	.04*	SBR	.17*

TOTAL CAPACITY UTILIZATION .25 .51

550 . Bristol St. at Newport Blvd. NB

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	690	.14	1319	.27*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	681	.14*	751	.16
SBR	0	0	0		0	
EBL	1.5		320	{.14}*	381	.12*
EBT	0	4800	0	.14	0	
EBR	1.5		329		209	{.05}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .28 .39

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineNoProj\EXE-193\ICU\Y15NP-COM02-102809

715 . Bristol St. at I-405 NB Ramps

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6400	1718	.27*	2054	.32*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	5	8000	1733	.22	2229	.29
SBR	0	0	17		64	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	2	3200	49	.02	318	.10
WBL	1.5		106		212	
WBT	1.5	4800	73	.04*	317	.11*
WBR	2	3200	603	.19	886	.28
Right Turn Adjustment			WBR	.15*	Multi	.25*
TOTAL CAPACITY UTILIZATION				.46		.68

716 . Bristol St. at I-405 SB Ramps

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	156	.10*	219	.14*
NBT	4	6400	1213	.19	2108	.33
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	1007	.21*	1681	.35*
SBR	f		844		1163	
EBL	3	4800	707	.15*	637	.13*
EBT	0	0	0		0	
EBR	1	1600	533	.33	202	.13
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.10*		
TOTAL CAPACITY UTILIZATION				.56		.62

717 . Bear St. at SR-73 SB Ramps

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3200	450	.27*	933	.37*
NBR	0	0	420		235	
SBL	2	3200	570	.18*	965	.30*
SBT	2	3200	510	.16	1198	.37
SBR	0	0	0		0	
EBL	1.5		120	.08*	227	{.13}*
EBT	0	3200	0		0	.13
EBR	0.5		220	.14	192	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
TOTAL CAPACITY UTILIZATION				.53		.80

718 . Bear St. at SR-73 NB Ramps

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	121	.08*	339	.21*
NBT	2	3200	389	.12	629	.20
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	859	.20*	1101	.29*
SBR	0	0	101		281	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	140	.09*	259	.16*
WBT	0	0	0		0	
WBR	2	3200	470	.15	1051	.33
TOTAL CAPACITY UTILIZATION				.37		.66

721 . Flower St. at Sunflower Av.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	26	.02*	47	.03
NBT	2	3200	51	.02	361	.11*
NBR	1	1600	33	.02	63	.04
SBL	1	1600	122	.08	52	.03*
SBT	2	3200	192	.10*	144	.09
SBR	0	0	115		183	.11
EBL	2	3200	54	.02	232	.07*
EBT	3	4800	655	.15*	645	.15
EBR	0	0	41		64	
WBL	2	3200	47	.01*	52	.02
WBT	3	4800	309	.07	1020	.23*
WBR	0	0	34		78	

TOTAL CAPACITY UTILIZATION .28 .44

722 . Anton Blvd. at Sunflower Av.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	12	.01*	10	.01*
NBT	0	0	0		0	
NBR	2	3200	218	.07	541	.17
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	942	.20*	729	.16*
EBR	0	0	38		22	
WBL	1	1600	282	.18*	348	.22*
WBT	3	4800	418	.09	1290	.27
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .39 .39

726 . Main St. at Sunflower Av.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	351	.11*	1013	.32*
NBT	3	4800	259	.05	867	.18
NBR	0	0	3		1	
SBL	1	1600	9	.01	1	.00
SBT	2	3200	549	.17*	343	.11*
SBR	1	1600	271	.17	577	.36
EBL	1.5		474	{.15}*	573	{.18}*
EBT	0.5	3200	0	.15	0	.18
EBR	2	3200	716	.22	567	.18
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.11*

TOTAL CAPACITY UTILIZATION .43 .72

735 . Newport Blvd. NB at Del Mar Av./University Dr.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		103		117	
NBT	2.5	4800	1156	.26*	743	.18*
NBR	1	1600	81	.05	109	.07
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	871	.27*	537	.17*
EBT	2	3200	309	.10	423	.13
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	207	.06*	244	.08*
WBR	1	1600	353	.22	206	.13
Right Turn Adjustment			WBR	.16*	WBR	.05*

TOTAL CAPACITY UTILIZATION .75 .48

736 . Newport Blvd. SB at Del Mar Av./University

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	146	.09	283	.18
SBT	3	4800	451	.09*	1265	.26*
SBR	f		444		1149	
EBL	0	0	0		0	
EBT	4	6400	964	.16*	647	.11*
EBR	0	0	35		45	
WBL	1	1600	114	.07*	70	.04*
WBT	2	3200	206	.06	291	.09
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .32 .41

737 . Newport Blvd. NB at Mesa Dr.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	15	.01	17	.01
NBT	2	3200	432	.19*	372	.15*
NBR	0	0	183		101	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	63	.02*	61	.02*
EBT	1	1600	157	.10	279	.17
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1600	85	.09*	283	.21*
WBR	0	0	55		48	

TOTAL CAPACITY UTILIZATION .30 .38

738 . Newport Blvd. SB at Mesa Dr.

Y2015 No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	210	.13	340	.21
SBT	4	6400	960	.15*	2370	.37*
SBR	1	1600	0	.00	0	.00
EBL	0	0	0		0	
EBT	1	1600	0	.00*	0	.00*
EBR	1	1600	0	.00	0	.00
WBL	1	1600	90	.06*	310	.19*
WBT	1	1600	0	.00	0	.00
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .21 .56

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineNoProj\EXE-193\ICU\Y15NP-IRV01-102809

42 . Red Hill Av. at Barranca Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	235	.07*	739	.22
NBT	4	6800	417	.06	1751	.26*
NBR	d	1700	75	.04	190	.11
SBL	2	3400	356	.10	317	.09*
SBT	4	6800	1058	.16*	492	.07
SBR	d	1700	165	.10	161	.09
EBL	2	3400	215	.06	229	.07*
EBT	4	6800	1019	.20*	785	.14
EBR	0	0	334		166	
WBL	2	3400	358	.11*	111	.03
WBT	4	6800	650	.10	740	.11*
WBR	1	1700	198	.12	419	.25
Right Turn Adjustment					WBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.59		.65

43 . Red Hill Av. at Deere Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	45	.03
NBT	3	5100	661	.13	2434	.48*
NBR	d	1700	70	.04	27	.02
SBL	1	1700	74	.04	22	.01*
SBT	3	5100	1512	.30*	764	.15
SBR	d	1700	121	.07	18	.01
EBL	1	1700	10	.01	104	.06
EBT	1	1700	37	.04*	81	.11*
EBR	0	0	34		106	
WBL	1	1700	13	.01*	60	.04*
WBT	1	1700	19	.01	68	.04
WBR	1	1700	28	.02	202	.12
Right Turn Adjustment					WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.46		.71

44 . Red Hill Av. at Alton Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	116	.07*	35	.02
NBT	3	5100	696	.20	2079	.48*
NBR	0	0	362	.21	361	
SBL	1	1700	201	.12	142	.08*
SBT	3	5100	1420	.28*	799	.16
SBR	d	1700	75	.04	13	.01
EBL	1	1700	6	.00	34	.02
EBT	2	3400	46	.01*	196	.06*
EBR	1	1700	43	.03	111	.07
WBL	2	3400	417	.12*	539	.16*
WBT	1	1700	159	.09	116	.07
WBR	1	1700	67	.04	496	.29
Right Turn Adjustment					WBR	.03*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.53		.86

45 . Red Hill Av. at McGaw Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	485	.14*	140	.04
NBT	3	5100	1056	.21	2061	.40*
NBR	1	1700	272	.16	138	.08
SBL	2	3400	241	.07	56	.02*
SBT	3	5100	1543	.30*	1412	.28
SBR	d	1700	59	.03	63	.04
EBL	1	1700	13	.01	91	.05
EBT	2	3400	27	.02*	97	.06*
EBR	0	0	91	.05	351	.21
WBL	2	3400	196	.06*	295	.09*
WBT	2	3400	76	.04	58	.03
WBR	0	0	51		237	.14
Right Turn Adjustment					Multi	.06*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.57		.68

47 . Red Hill Av. at MacArthur Blvd.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	77	.05*	359	.21*
NBT	3	5100	673	.14	935	.20
NBR	0	0	30		68	
SBL	2	3400	290	.09	450	.13
SBT	3	5100	1079	.21*	758	.15*
SBR	f		481		1075	
EBL	2	3400	981	.29*	820	.24*
EBT	3	5100	520	.10	332	.07
EBR	d	1700	169	.10	180	.11
WBL	1	1700	72	.04	91	.05
WBT	3	5100	452	.09*	806	.16*
WBR	f		546		715	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.69		.81

48 . Red Hill Av. at Sky Park N

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	31	.02	29	.02
NBT	2	3400	665	.20*	1023	.30*
NBR	d	1700	57	.03	32	.02
SBL	1	1700	175	.10*	95	.06*
SBT	2	3400	919	.27	879	.26
SBR	d	1700	174	.10	61	.04
EBL	1	1700	22	.01*	76	.04*
EBT	1	1700	29	.02	33	.02
EBR	1	1700	18	.01	41	.02
WBL	1	1700	17	.01	93	.05
WBT	1	1700	26	.07*	91	.20*
WBR	0	0	96		256	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.43		.65

49 . Red Hill Av. at Main St.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	208	.06*	344	.10*
NBT	2	3400	660	.19	800	.24
NBR	1	1700	384	.23	258	.15
SBL	2	3400	122	.04	180	.05
SBT	2	3400	659	.23*	728	.32*
SBR	0	0	132		344	
EBL	2	3400	169	.05	228	.07
EBT	3	5100	1105	.29*	1062	.29*
EBR	0	0	350		432	
WBL	2	3400	241	.07*	430	.13*
WBT	3	5100	460	.11	1251	.27
WBR	0	0	90		121	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.70		.89

70 . Gillette Av. at Main St.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	65	.02*	291	.09*
NBT	1	1700	5	.00	22	.01
NBR	1	1700	30	.02	477	.28
SBL	2	3400	29	.01	235	.07
SBT	1	1700	22	.01*	17	.01*
SBR	d	1700	40	.02	259	.15
EBL	2	3400	303	.09*	84	.02*
EBT	4	6800	931	.14	1323	.19
EBR	f		330		81	
WBL	2	3400	248	.07	62	.02
WBT	3	5100	925	.22*	965	.19*
WBR	0	0	213		23	
Right Turn Adjustment					Multi	.35*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.39		.71

71 . Armstrong St. at Barranca Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	26	.02*	169	.10
NBT	1	1700	25	.01	231	.14*
NBR	1	1700	50	.03	280	.16
SBL	1	1700	146	.09	135	.08*
SBT	1	1700	155	.09*	103	.06
SBR	1	1700	75	.04	82	.05
EBL	1	1700	57	.03	91	.05
EBT	3	5100	1033	.20*	957	.19*
EBR	d	1700	125	.07	86	.05
WBL	1	1700	280	.16*	139	.08*
WBT	4	6800	1209	.20	1018	.17
WBR	0	0	138		148	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .54

77 . MacArthur Bl. at Sky Park E.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	114	.07*	88	.05
NBT	3	5100	939	.18	1512	.30*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6800	840	.15*	768	.12
SBR	0	0	148		62	
EBL	2	3400	35	.01*	168	.05*
EBT	0	0	0		0	
EBR	1	1700	64	.04	252	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .28 .40

78 . MacArthur Bl. at Main St.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	781	.23*	639	.19*
NBT	4	6800	725	.11	1077	.16
NBR	f		1279		457	
SBL	2	3400	383	.11	241	.07
SBT	4	6800	503	.07*	930	.14*
SBR	1	1700	93	.05	91	.05
EBL	1	1700	69	.04	83	.05
EBT	3	5100	568	.11*	632	.12*
EBR	1	1700	282	.17	586	.34
WBL	2	3400	236	.07*	564	.17*
WBT	3	5100	506	.10	649	.13
WBR	f		166		559	
Right Turn Adjustment					EBR	.03*
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for EBR						

TOTAL CAPACITY UTILIZATION .53 .70

79 . MacArthur Bl. at I-405 NB Ramps

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	2061	.30*	1807	.27*
NBR	2	3400	298	.09	947	.28
SBL	2	3400	212	.06*	583	.17*
SBT	4	6800	958	.14	1486	.22
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	902	.27*	574	.17*
WBT	0	0	0		0	
WBR	2	3400	679	.20	293	.09
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .66

80 . MacArthur Bl. at I-405 SB Ramps

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1204	.18*	2063	.30*
NBR	1	1700	373	.22	672	.40
SBL	2	3400	187	.06*	588	.17*
SBT	4	6800	1154	.17	1167	.17
SBR	1	1700	491	.29	369	.22
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	1006	.30*	633	.19*
WBT	1	1700	299	.18	301	.18
WBR	f		1096		637	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .71

82 . MacArthur Bl. at Michelson Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	243	.14*	127	.07
NBT	4	6800	1217	.18	1531	.23*
NBR	1	1700	220	.13	100	.06
SBL	2	3400	308	.09	725	.21*
SBT	4	6800	1895	.28*	1659	.24
SBR	0	0	0		0	
EBL	2	3400	282	.08*	439	.13
EBT	2	3400	152	.06	185	.08*
EBR	0	0	50		98	
WBL	2	3400	75	.02	432	.13*
WBT	1	1700	77	.05*	83	.05
WBR	1	1700	161	.09	710	.42
Right Turn Adjustment					WBR	.13*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION .60 .83

83 . MacArthur Bl. at Douglas Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1526	.23*	1474	.22
NBR	0	0	37		32	
SBL	2	3400	273	.08*	148	.04
SBT	4	6800	1564	.23	1967	.29*
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	16	.01*	23	.01*
WBT	0	0	0		0	
WBR	1	1700	94	.06	166	.10
Right Turn Adjustment					WBR	.04*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .37 .39

87 . Dupont Dr. at Michelson Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	72	.04*	200	.12*
NBT	2	3400	45	.02	30	.02
NBR	0	0	24		60	.04
SBL	1	1700	14	.01	85	.05
SBT	2	3400	12	.01*	31	.02*
SBR	0	0	15	.01	104	.06
EBL	1	1700	69	.04	46	.03*
EBT	2	3400	482	.22*	494	.16
EBR	0	0	276		50	
WBL	1	1700	23	.01*	19	.01
WBT	3	5100	243	.06	847	.17*
WBR	0	0	87		44	
Right Turn Adjustment					SBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .33 .41

97 . Von Karman Av. at Barranca Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	139	.04*	464	.14*
NBT	2	3400	63	.02	205	.06
NBR	d	1700	159	.09	722	.42
SBL	2	3400	103	.03	120	.04
SBT	2	3400	485	.14*	187	.06*
SBR	2	3400	92	.03	78	.02
EBL	1	1700	30	.02	33	.02
EBT	3	5100	629	.12*	1078	.21*
EBR	d	1700	331	.19	188	.11
WBL	2	3400	705	.21*	215	.06*
WBT	4	6800	1214	.18	798	.12
WBR	1	1700	68	.04	42	.02
Right Turn Adjustment			EBR	.04*	NBR	.21*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.60		.73

98 . Von Karman Av. at Alton Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	54	.03*	162	.10
NBT	2	3400	328	.10	1050	.31*
NBR	d	1700	61	.04	453	.27
SBL	1	1700	60	.04	221	.13*
SBT	2	3400	1072	.32*	345	.10
SBR	d	1700	42	.02	75	.04
EBL	1	1700	30	.02*	49	.03
EBT	2	3400	239	.07	875	.26*
EBR	d	1700	45	.03	88	.05
WBL	1	1700	343	.20	107	.06*
WBT	2	3400	943	.28*	514	.15
WBR	d	1700	182	.11	101	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.70		.81

99 . Von Karman Av. at McGaw Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	48	.03*	37	.02
NBT	2	3400	371	.11	1909	.56*
NBR	d	1700	31	.02	107	.06
SBL	1	1700	43	.03	33	.02*
SBT	2	3400	1316	.39*	485	.14
SBR	d	1700	40	.02	25	.01
EBL	1	1700	12	.01	75	.04
EBT	2	3400	106	.04*	350	.12*
EBR	0	0	42		68	
WBL	1	1700	148	.09*	28	.02*
WBT	2	3400	293	.10	158	.07
WBR	0	0	39		86	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.60		.77

100 . Von Karman Av. at Main St.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	110	.03*	284	.08
NBT	2	3400	285	.08	1046	.31*
NBR	1	1700	75	.04	240	.14
SBL	1	1700	93	.05	136	.08*
SBT	2	3400	1130	.33*	538	.16
SBR	1	1700	287	.17	166	.10
EBL	2	3400	253	.07*	556	.16
EBT	3	5100	522	.10	1484	.29*
EBR	f		275		161	
WBL	2	3400	295	.09	112	.03*
WBT	3	5100	973	.21*	630	.14
WBR	0	0	93		98	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.69		.76

101 . Von Karman Av. at Morse Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	235	.07*	73	.02
NBT	2	3400	449	.16	1301	.39*
NBR	0	0	98		14	
SBL	1	1700	144	.08	33	.02*
SBT	2	3400	1102	.32*	721	.21
SBR	f		153		27	
EBL	1	1700	11	.01*	54	.03*
EBT	1	1700	9	.01	2	.00
EBR	f		50		244	
WBL	1	1700	9	.01	89	.05
WBT	1	1700	2	.02*	11	.10*
WBR	0	0	30		161	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .47 .59

102 . Von Karman Av. at Michelson Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	42	.02	58	.03*
NBT	2	3400	838	.25*	927	.27
NBR	1	1700	70	.04	98	.06
SBL	1	1700	156	.09*	263	.15
SBT	2	3400	658	.22	1285	.43*
SBR	0	0	106		175	
EBL	1	1700	146	.09*	196	.12*
EBT	2	3400	166	.06	489	.17
EBR	0	0	38		87	
WBL	1	1700	177	.10	158	.09
WBT	2	3400	353	.10*	567	.17*
WBR	f		360		327	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .80

103 . Von Karman Av. at Dupont Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	81	.05	36	.02*
NBT	2	3400	896	.27*	1031	.32
NBR	0	0	21		63	
SBL	1	1700	47	.03*	58	.03
SBT	2	3400	717	.21	1221	.36*
SBR	1	1700	38	.02	21	.01
EBL	1	1700	5	.00	19	.01
EBT	2	3400	52	.03*	109	.06*
EBR	0	0	62	.04	132	.08
WBL	1	1700	70	.04*	42	.02*
WBT	2	3400	113	.05	83	.05
WBR	0	0	68		94	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .42 .51

104 . Von Karman Av. at Martin

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	26	.02	16	.01*
NBT	2	3400	894	.26*	948	.28
NBR	1	1700	12	.01	31	.02
SBL	1	1700	17	.01*	26	.02
SBT	2	3400	678	.24	1262	.40*
SBR	0	0	133		95	
EBL	2	3400	50	.01*	153	.05*
EBT	1	1700	1	.01	3	.03
EBR	0	0	19		45	
WBL	1	1700	3	.00	28	.02
WBT	1	1700	1	.00*	8	.04*
WBR	0	0	6		53	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .33 .55

112 . Myford Rd. at Michelle Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	45	.01*	29	.01*
NBT	0	0	0		0	
NBR	1	1700	75	.04	261	.15
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	98	.03*	452	.13*
EBR	d	1700	13	.01	18	.01
WBL	1	1700	129	.08*	55	.03*
WBT	2	3400	250	.07	116	.03
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .17 .34

113 . Myford Rd. at Walnut Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	7	.00	106	.06
NBT	1	1700	6	.00*	81	.05*
NBR	f		68		342	
SBL	2	3400	63	.02*	168	.05*
SBT	1	1700	17	.01	12	.01
SBR	1	1700	114	.07	129	.08
EBL	1	1700	76	.04	41	.02*
EBT	2	3400	799	.24*	752	.22
EBR	d	1700	40	.02	9	.01
WBL	2	3400	323	.10*	40	.01
WBT	2	3400	789	.23	987	.29*
WBR	1	1700	198	.12	81	.05
Right Turn Adjustment					SBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .41 .48

114 . Millikan Av. at Barranca Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	58	.03*	43	.03
NBT	2	3400	26	.01	33	.01*
NBR	d	1700	46	.03	371	.22
SBL	2	3400	73	.02	350	.10*
SBT	0.5	3400	40	{.02}*	38	{.02}
SBR	1.5		47	{.02}	48	
EBL	2	3400	38	.01*	52	.02
EBT	3	5100	527	.10	1595	.31*
EBR	d	1700	141	.08	41	.02
WBL	1	1700	152	.09	35	.02*
WBT	4	6800	1541	.23*	741	.11
WBR	1	1700	189	.11	664	.39
Right Turn Adjustment					NBR	.19*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .34 .68

115 . Millikan Av. at Alton Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	2	.00	2	.00
NBT	1	1700	2	.00*	2	.00*
NBR	1	1700	6	.00	5	.00
SBL	1	1700	51	.03*	98	.06*
SBT	1	1700	3	.00	2	.00
SBR	1	1700	87	.05	142	.08
EBL	1	1700	69	.04*	175	.10
EBT	2	3400	273	.08	1047	.31*
EBR	d	1700	3	.00	3	.00
WBL	1	1700	23	.01	5	.00
WBT	2	3400	960	.28*	495	.15
WBR	d	1700	169	.10	73	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .40 .42

116 . Cartwright Rd. at Main St.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	25	.01*	81	.05*
NBT	1	1700	1	.00	2	.00
NBR	1	1700	23	.01	217	.13
SBL	2	3400	5	.00	89	.03
SBT	1	1700	2	.01*	3	.04*
SBR	0	0	13		59	
EBL	1	1700	49	.03*	20	.01
EBT	3	5100	474	.11	1794	.36*
EBR	0	0	80		24	
WBL	2	3400	188	.06	34	.01*
WBT	3	5100	1378	.28*	990	.20
WBR	0	0	70		8	
Right Turn Adjustment					NBR	.06*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.38		.57

119 . Teller Av. at Michelson Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	28	.02*	90	.05*
NBT	1	1700	2	.00	0	.00
NBR	1	1700	30	.02	429	.25
SBL	1	1700	13	.01	12	.01
SBT	1	1700	3	.00*	2	.00*
SBR	1	1700	5	.00	5	.00
EBL	1	1700	4	.00	6	.00
EBT	3	5100	287	.06*	1108	.22*
EBR	1	1700	61	.04	124	.07
WBL	1	1700	556	.33*	33	.02*
WBT	3	5100	1537	.30	664	.13
WBR	1	1700	34	.02	4	.00
Right Turn Adjustment					NBR	.19*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.46		.53

126 . Jamboree Rd. at Bryan Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	111	.03*	247	.07
NBT	4	6800	622	.09	1976	.29*
NBR	1	1700	130	.08	415	.24
SBL	2	3400	263	.08	72	.02*
SBT	4	6800	2312	.34*	824	.12
SBR	d	1700	128	.08	163	.10
EBL	2	3400	55	.02	226	.07
EBT	2	3400	297	.09*	523	.15*
EBR	d	1700	180	.11	113	.07
WBL	2	3400	508	.15*	313	.09*
WBT	2	3400	521	.15	510	.15
WBR	1	1700	243	.14	218	.13
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.66		.60

127 . Jamboree Rd. at El Camino Real

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	260	.08*	460	.14
NBT	4	6800	716	.11	1705	.25*
NBR	1	1700	534	.31	285	.17
SBL	1	1700	174	.10	100	.06*
SBT	4	6800	2534	.37*	855	.13
SBR	1	1700	134	.08	174	.10
EBL	1	1700	74	.04	207	.12
EBT	1	1700	142	.08*	177	.10*
EBR	2	3400	218	.06	317	.09
WBL	2	3400	338	.10*	676	.20*
WBT	2	3400	66	.03	239	.13
WBR	0	0	50		186	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.68		.66

128 . Jamboree Rd. at I-5 NB Ramps

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1206	.18	2585	.38*
NBR	f		683		690	
SBL	0	0	0		0	
SBT	4	6800	1792	.26*	1521	.22
SBR	f		479		480	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		1013	.30*	359	.21*
WBT	0	5100	0		0	
WBR	1.5		486	.29	965	.28
Right Turn Adjustment					WBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.61		.71

129 . Jamboree Rd. at I-5 SB Ramps

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1417	.21	2495	.37*
NBR	f		420		1110	
SBL	0	0	0		0	
SBT	4	6800	2062	.30*	1454	.21
SBR	f		550		430	
EBL	2	3400	463	.14*	725	.21*
EBT	0	0	0		0	
EBR	2	3400	988	.29	756	.22
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.15*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.64		.63

130 . Jamboree Rd. at Michelle Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	306	.18*	252	.15*
NBT	4	6800	1319	.19	2766	.41
NBR	d	1700	0	.00	0	.00
SBL	1	1700	0	.00	0	.00
SBT	4	6800	3146	.46*	1859	.27*
SBR	d	1700	754	.44	400	.24
EBL	2	3400	191	.06*	813	.24*
EBT	0.5	3400	0	.00	20	{.04}
EBR	1.5		194		319	
WBL	1	1700	0	.00	2	.00
WBT	1	1700	0	.00*	4	.01*
WBR	0	0	1		5	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.75		.72

131 . Jamboree Rd. SB at Walnut Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	340	.10	335	.10
SBT	2	3400	639	.19*	573	.17*
SBR	1	1700	241	.14	157	.09
EBL	0	0	0		0	
EBT	3	5100	380	.07*	645	.13*
EBR	1	1700	200	.12	339	.20
WBL	2	3400	391	.12*	238	.07*
WBT	3	5100	529	.10	733	.14
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.05*	EBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.48		.49

132 . Jamboree Rd. NB at Walnut Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	296	.09	543	.16*
NBT	2	3400	339	.10*	486	.14
NBR	d	1700	193	.11	531	.31
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3400	40	.01*	167	.05*
EBT	3	5100	673	.13	884	.17
EBR	0	0	0		0	
WBL	0	0	4		0	
WBT	3	5100	943	.19*	830	.16*
WBR	1	1700	416	.24	439	.26
Right Turn Adjustment			WBR	.05*	Multi	.20*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.40		.62

133 . Jamboree Rd. at Edinger Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	86	.03	188	.06
NBT	0	0	0		0	
NBR	1	1700	74	.04	342	.20
SBL	2	3400	227	.07*	412	.12*
SBT	0	0	0		0	
SBR	f		813		318	
EBL	2	3400	228	.07*	496	.15*
EBT	3	5100	519	.10	909	.19
EBR	0	0	13		75	
WBL	2	3400	220	.06	117	.03
WBT	3	5100	1129	.22*	773	.15*
WBR	1	1700	421	.25	210	.12
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.41		.59

134 . Loop Rd. at Warner Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	65	.04
NBT	1	1700	10	.01*	176	.10*
NBR	1	1700	109	.06	474	.28
SBL	1	1700	138	.08*	197	.12*
SBT	2	3400	162	.05	325	.10
SBR	1	1700	923	.54	236	.14
EBL	1	1700	31	.02*	30	.02
EBT	2	3400	558	.16	1783	.52*
EBR	1	1700	74	.04	31	.02
WBL	2	3400	147	.04	299	.09*
WBT	2	3400	678	.20*	435	.13
WBR	1	1700	9	.01	19	.01
Right Turn Adjustment			SBR	.45*	NBR	.11*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.81		.99

136 . Jamboree Rd. at Barranca Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05*	254	.07
NBT	4	6800	926	.14	2944	.43*
NBR	f		104		241	
SBL	2	3400	324	.10	355	.10*
SBT	4	6800	2999	.44*	1469	.22
SBR	f		966		348	
EBL	2.5		184	.05	1083	
EBT	2.5	8500	524	.10*	774	.22*
EBR	1	1700	102	.06	122	.07
WBL	2	3400	273	.08	238	.07
WBT	3	5100	806	.16*	819	.16*
WBR	f		210		453	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing

TOTAL CAPACITY UTILIZATION .80 .96

137 . Jamboree Rd. at Beckman Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	35	.02*	8	.00
NBT	4	6800	1125	.18	3282	.49*
NBR	0	0	104		33	
SBL	1	1700	60	.04	37	.02*
SBT	4	6800	3240	.50*	1778	.27
SBR	0	0	185		32	
EBL	1	1700	41	.02*	209	.12*
EBT	1	1700	7	.00	20	.01
EBR	d	1700	3	.00	11	.01
WBL	1	1700	77	.05	51	.03
WBT	1	1700	31	.04*	10	.03*
WBR	0	0	44		48	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .63 .71

138 . Jamboree Rd. at Alton Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	271	.08*	207	.06
NBT	4	6800	957	.14	2782	.41*
NBR	1	1700	162	.10	218	.13
SBL	2	3400	180	.05	198	.06*
SBT	4	6800	2773	.44*	1624	.26
SBR	0	0	245		146	
EBL	2	3400	54	.02*	195	.06
EBT	3	5100	208	.05	1144	.26*
EBR	0	0	68		165	
WBL	2	3400	199	.06	242	.07*
WBT	3	5100	874	.17*	437	.09
WBR	d	1700	158	.09	173	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .85

139 . Jamboree Rd. at McGaw Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	229	.07*	63	.02
NBT	4	6800	1347	.20	2971	.45*
NBR	0	0	32		59	
SBL	2	3400	19	.01	20	.01*
SBT	4	6800	2664	.43*	1838	.28
SBR	0	0	269		39	
EBL	1	1700	21	.01*	237	.14*
EBT	2	3400	19	.01	151	.09
EBR	0	0	20	.01	171	.10
WBL	1	1700	26	.02	34	.02
WBT	2	3400	72	.03*	28	.02*
WBR	0	0	13		28	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .67

140 . Jamboree Rd. at Kelvin Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	136	.08*	114	.07
NBT	4	6800	1501	.24	3094	.49*
NBR	0	0	106		210	
SBL	1	1700	7	.00	10	.01*
SBT	4	6800	3051	.45*	2276	.33
SBR	d	1700	18	.01	25	.01
EBL	1	1700	25	.01	24	.01
EBT	1	1700	7	.00*	11	.01*
EBR	d	1700	88	.05	116	.07
WBL	1	1700	68	.04*	101	.06*
WBT	1	1700	6	.01	12	.01
WBR	0	0	6		7	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .62

141 . Jamboree Rd. at Main St.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	610	.18*	481	.14
NBT	4	6800	1555	.23	2554	.38*
NBR	f		197		499	
SBL	2	3400	442	.13	309	.09*
SBT	4	6800	2313	.34*	2140	.31
SBR	1	1700	573	.34	159	.09
EBL	2	3400	97	.03	423	.12
EBT	3	5100	211	.04*	1145	.22*
EBR	f		182		702	
WBL	2	3400	665	.20*	572	.17*
WBT	3	5100	697	.14	311	.06
WBR	f		98		286	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .81 .91

143 . Jamboree Rd. at I-405 NB Ramps

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1646	.32*	3328	.65*
NBR	f		500		910	
SBL	0	0	0		0	
SBT	4	6800	1672	.25	2326	.34
SBR	f		1620		1140	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	3	5100	1448	.28*	654	.13*
WBT	0	0	0		0	
WBR	f		914		222	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .83

144 . Jamboree Rd. at I-405 SB Ramps

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1370	.20	2664	.39*
NBR	f		547		990	
SBL	0	0	0		0	
SBT	4	6800	2800	.41*	2512	.37
SBR	f		274		640	
EBL	1.5		810	{.34}*	1496	.44*
EBT	0	6800	0	.34	0	
EBR	2.5		1529		668	.20
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .80 .88

145 . Jamboree Rd. at Michelson Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	178	.10*	66	.04
NBT	4	6800	1286	.19	2175	.32*
NBR	1	1700	166	.10	479	.28
SBL	2	3400	572	.17	985	.29*
SBT	4	6800	2395	.35*	1811	.27
SBR	f		615		434	
EBL	2	3400	181	.05*	1018	.30*
EBT	2	3400	147	.06	346	.15
EBR	0	0	52		157	
WBL	2	3400	295	.09	262	.08
WBT	2	3400	483	.14*	250	.07*
WBR	f		462		618	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.69		1.03

146 . Jamboree Rd. at Dupont Rd.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	197	.12*	73	.04
NBT	4	6800	1409	.21	2309	.34*
NBR	1	1700	10	.01	27	.02
SBL	1	1700	50	.03	176	.10*
SBT	3	5100	2224	.44*	1863	.37
SBR	d	1700	480	.28	170	.10
EBL	1	1700	57	.03*	351	.21*
EBT	2	3400	10	.01	57	.03
EBR	0	0	33	.02	242	.14
WBL	1	1700	32	.02	28	.02
WBT	2	3400	53	.03*	17	.01*
WBR	0	0	135	.08	55	.03
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.67		.71

164 . Construction S. at Barranca Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	31	.02*	336	.20*
NBT	1	1700	9	.01	12	.16
NBR	0	0	10		262	
SBL	1	1700	26	.02	23	.01
SBT	1	1700	51	.03*	15	.01*
SBR	1	1700	115	.07	72	.04
EBL	1	1700	125	.07	93	.05*
EBT	3	5100	784	.15*	1280	.25
EBR	1	1700	110	.06	21	.01
WBL	1	1700	249	.15*	74	.04
WBT	3	5100	954	.19	1368	.27*
WBR	d	1700	26	.02	25	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.40		.58

168 . Murphy Av. at Alton Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	19	.01*	70	.04
NBT	1	1700	14	.03	120	.26*
NBR	0	0	37		322	
SBL	1	1700	20	.01	103	.06*
SBT	1	1700	29	.04*	39	.10
SBR	0	0	31		128	
EBL	1	1700	116	.07*	53	.03
EBT	3	5100	372	.07	1415	.28*
EBR	d	1700	44	.03	29	.02
WBL	1	1700	127	.07	61	.04*
WBT	3	5100	1250	.25*	642	.13
WBR	d	1700	120	.07	17	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.42		.69

170 . Union at Main St.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	124	.04*	574	.17*
NBT	1	1700	3	.01	8	.05
NBR	0	0	12		84	
SBL	1	1700	14	.01	37	.02
SBT	1	1700	2	.00*	1	.00*
SBR	1	1700	33	.02	32	.02
EBL	2	3400	90	.03*	105	.03
EBT	3	5100	483	.09	1826	.36*
EBR	f		262		86	
WBL	2	3400	66	.02	34	.01*
WBT	3	5100	1372	.27*	564	.12
WBR	0	0	7		28	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .39 .59

171 . Veneto at Main St.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	237	.07*	159	.05
NBT	1	1700	6	.02	23	.11*
NBR	0	0	27		168	
SBL	1	1700	46	.03	29	.02*
SBT	1	1700	12	.05*	7	.02
SBR	0	0	72		24	
EBL	1	1700	23	.01*	104	.06
EBT	3	5100	297	.07	1663	.34*
EBR	0	0	51		93	
WBL	2	3400	78	.02	39	.01*
WBT	3	5100	1021	.20*	367	.08
WBR	0	0	20		33	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .38 .53

174 . Carlson Av. at Michelson Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	487	.14*	107	.03*
NBT	2	3400	103	.03	69	.02
NBR	1	1700	120	.07	314	.18
SBL	2	3400	13	.00	91	.03
SBT	1	1700	15	.01*	112	.07*
SBR	f		142		378	
EBL	2	3400	386	.11*	431	.13
EBT	2	3400	446	.13	976	.29*
EBR	1	1700	75	.04	411	.24
WBL	1	1700	140	.08	237	.14*
WBT	2	3400	661	.19*	635	.19
WBR	f		51		100	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .50 .58

175 . Carlson Av. at Campus Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	144	.08*	149	.09*
SBT	0	0	2		0	
SBR	1	1700	276	.16	122	.07
EBL	1	1700	79	.05*	283	.17
EBT	1	1700	469	.28	1071	.63*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1700	870	.51*	608	.36
WBR	d	1700	81	.05	117	.07
Right Turn Adjustment			SBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .73 .77

180 . Harvard Av. at Walnut Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	257	.08*	287	.08
NBT	1	1700	64	.04	68	.04*
NBR	d	1700	112	.07	205	.12
SBL	1	1700	185	.11	131	.08*
SBT	1	1700	115	.07*	49	.03
SBR	1	1700	163	.10	60	.04
EBL	1	1700	31	.02*	129	.08
EBT	2	3400	323	.10	824	.24*
EBR	1	1700	189	.11	287	.17
WBL	1	1700	115	.07	154	.09*
WBT	2	3400	1040	.31*	633	.19
WBR	d	1700	125	.07	43	.03
Right Turn Adjustment			SBR	.01*	NBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.54		.51

181 . Harvard Av. at Edinger Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	217	.06*	219	.06
NBT	2	3400	172	.05	427	.13*
NBR	1	1700	100	.06	251	.15
SBL	1	1700	196	.12	97	.06*
SBT	2	3400	361	.11*	174	.05
SBR	d	1700	126	.07	62	.04
EBL	2	3400	58	.02*	160	.05*
EBT	3	5100	634	.12	1152	.23
EBR	1	1700	155	.09	109	.06
WBL	2	3400	294	.09	87	.03
WBT	3	5100	1387	.29*	1049	.23*
WBR	0	0	100		123	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.53		.52

182 . Harvard Av. at Paseo Westpark

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	87	.05*	0	.00
NBT	2	3400	254	.07	831	.24*
NBR	d	1700	27	.02	106	.06
SBL	1	1700	29	.02	27	.02*
SBT	2	3400	750	.22*	372	.11
SBR	1	1700	113	.07	53	.03
EBL	1	1700	38	.02	51	.03
EBT	1	1700	44	.03*	96	.06*
EBR	d	1700	0	.00	0	.00
WBL	1	1700	170	.10*	58	.03*
WBT	1	1700	0	.00	47	.03
WBR	d	1700	209	.12	88	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.45		.40

183 . Harvard Av. at Warner Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	99	.06*	216	.13
NBT	2	3400	206	.06	889	.26*
NBR	d	1700	65	.04	158	.09
SBL	1	1700	105	.06	70	.04*
SBT	2	3400	806	.24*	336	.10
SBR	d	1700	119	.07	57	.03
EBL	1	1700	119	.07*	180	.11*
EBT	2	3400	302	.09	602	.18
EBR	d	1700	138	.08	100	.06
WBL	1	1700	141	.08	64	.04
WBT	2	3400	604	.18*	397	.12*
WBR	d	1700	85	.05	80	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.60		.58

184 . Harvard Av. at Barranca Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	166	.10*	312	.18
NBT	2	3400	303	.09	1003	.29*
NBR	1	1700	71	.04	125	.07
SBL	1	1700	144	.08	76	.04*
SBT	2	3400	752	.22*	351	.10
SBR	1	1700	194	.11	52	.03
EBL	2	3400	39	.01*	142	.04
EBT	3	5100	374	.07	998	.20*
EBR	1	1700	147	.09	248	.15
WBL	2	3400	202	.06	121	.04*
WBT	3	5100	1041	.22*	775	.17
WBR	0	0	68		115	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.60		.62

185 . Harvard Av. at Alton Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	286	.17*	127	.07
NBT	2	3400	382	.11	1211	.36*
NBR	d	1700	77	.05	194	.11
SBL	1	1700	33	.02	97	.06*
SBT	2	3400	869	.26*	486	.14
SBR	1	1700	275	.16	90	.05
EBL	2	3400	76	.02*	299	.09
EBT	3	5100	200	.04	1129	.22*
EBR	1	1700	106	.06	245	.14
WBL	2	3400	205	.06	160	.05*
WBT	3	5100	1010	.21*	413	.09
WBR	0	0	43		60	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.71		.74

186 . Harvard Av. at Main St.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	118	.03*	119	.04
NBT	2	3400	341	.10	1110	.33*
NBR	1	1700	72	.04	301	.18
SBL	2	3400	52	.02	32	.01*
SBT	2	3400	925	.27*	638	.19
SBR	1	1700	472	.28	139	.08
EBL	2	3400	140	.04*	720	.21
EBT	3	5100	196	.06	1341	.32*
EBR	0	0	94		269	
WBL	2	3400	361	.11	125	.04*
WBT	3	5100	720	.15*	191	.04
WBR	0	0	30		23	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.54		.75

187 . Harvard Av. at Coronado

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	183	.05*	188	.06
NBT	2	3400	430	.13	1315	.40*
NBR	0	0	9		35	
SBL	1	1700	30	.02	68	.04*
SBT	2	3400	1151	.34*	842	.25
SBR	d	1700	177	.10	71	.04
EBL	2	3400	43	.01*	110	.03
EBT	1	1700	1	.00	67	.04*
EBR	d	1700	136	.08	253	.15
WBL	1	1700	33	.02	15	.01*
WBT	1	1700	10	.01*	11	.01
WBR	1	1700	88	.05	55	.03
Right Turn Adjustment			EBR	.04*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.50		.54

188 . Harvard Av. at Michelson Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	104	.06*	62	.04
NBT	2	3400	300	.10	887	.29*
NBR	0	0	26		104	
SBL	1	1700	137	.08	344	.20*
SBT	2	3400	715	.21*	565	.17
SBR	1	1700	437	.26	213	.13
EBL	2	3400	92	.03*	409	.12
EBT	2	3400	169	.05	933	.27*
EBR	f		39		121	
WBL	1	1700	138	.08	83	.05*
WBT	2	3400	761	.28*	305	.14
WBR	0	0	180		173	
Right Turn Adjustment			SBR	.03*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.66		.86

189 . Harvard Av. at University Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	72	.04*	67	.04
NBT	2	3400	244	.07	525	.15*
NBR	d	1700	45	.03	199	.12
SBL	1	1700	16	.01	79	.05*
SBT	2	3400	419	.12*	463	.14
SBR	d	1700	413	.24	268	.16
EBL	1	1700	139	.08*	512	.30*
EBT	3	5100	550	.12	1693	.34
EBR	0	0	43		66	
WBL	1	1700	109	.06	111	.07
WBT	3	5100	1781	.36*	785	.16*
WBR	0	0	78		34	
Right Turn Adjustment			SBR	.06*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.71		.71

190 . University Dr. at Campus Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	90	.05*	185	.11*
NBT	3	5100	543	.11	1464	.29
NBR	1	1700	313	.18	352	.21
SBL	1	1700	104	.06	76	.04
SBT	2	3400	1660	.49*	878	.26*
SBR	1	1700	203	.12	76	.04
EBL	1	1700	185	.11*	360	.21*
EBT	2	3400	363	.11	572	.17
EBR	d	1700	15	.01	108	.06
WBL	1	1700	36	.02	224	.13
WBT	2	3400	427	.13*	519	.15*
WBR	d	1700	242	.14	106	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.83		.78

191 . Mesa Rd. at University Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	18	.01*	142	.08*
NBT	0	0	0		0	
NBR	1	1700	52	.03	199	.12
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	921	.27	1941	.57*
EBR	1	1700	88	.05	50	.03
WBL	1	1700	163	.10	120	.07*
WBT	2	3400	1688	.50*	1028	.30
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.56		.77

192 . California Av. at University Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	44	.01*	234	.07*
NBT	0	0	0		0	
NBR	1	1700	96	.06	766	.45
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	974	.29*	1165	.34*
EBR	1	1700	306	.18	57	.03
WBL	2	3400	724	.21*	83	.02*
WBT	2	3400	1006	.30	1114	.33
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.36*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.56		.84

193 . MacArthur Blvd. NB at University Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	61	.04*	25	.01*
NBT	0	0	0		0	
NBR	1	1700	239	.14	317	.19
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1046	.21*	863	.17*
EBR	d	1700	102	.06	84	.05
WBL	2	3400	279	.08*	626	.18*
WBT	2	3400	802	.24	735	.22
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.04*	NBR	.04*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.42		.45

196 . Hearthstone Bl. at ICD

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	29	.02*	23	.01
NBT	2	3400	48	.01	51	.02*
NBR	d	1700	328	.19	227	.13
SBL	1	1700	38	.02	27	.02*
SBT	1	1700	44	.03*	38	.02
SBR	d	1700	29	.02	25	.01
EBL	1	1700	27	.02*	92	.05
EBT	3	5100	875	.19	1426	.29*
EBR	0	0	69		74	
WBL	1	1700	197	.12	318	.19*
WBT	3	5100	1562	.31*	1402	.28
WBR	0	0	15		37	
Right Turn Adjustment			NBR	.05*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.48		.57

198 . Paseo Westpark at Warner Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	148	.09*	124	.07
NBT	1	1700	106	.06	279	.16*
NBR	d	1700	36	.02	46	.03
SBL	1	1700	46	.03	53	.03*
SBT	1	1700	306	.18*	116	.07
SBR	d	1700	78	.05	51	.03
EBL	1	1700	144	.08*	118	.07
EBT	2	3400	329	.10	524	.15*
EBR	d	1700	86	.05	158	.09
WBL	1	1700	68	.04	48	.03*
WBT	2	3400	544	.16*	358	.11
WBR	d	1700	110	.06	65	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .56 .42

199 . Paseo Westpark at Barranca Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	104	.03*	172	.05
NBT	1	1700	95	.06	314	.18*
NBR	1	1700	141	.08	204	.12
SBL	2	3400	109	.03	82	.02*
SBT	1	1700	277	.16*	158	.09
SBR	d	1700	104	.06	70	.04
EBL	1	1700	25	.01*	98	.06
EBT	3	5100	520	.10	1081	.21*
EBR	1	1700	84	.05	160	.09
WBL	1	1700	169	.10	125	.07*
WBT	3	5100	1292	.26*	854	.19
WBR	0	0	40		122	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .51 .53

200 . Paseo Westpark at Alton Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	94	.06	74	.04
NBT	1	1700	147	.14*	285	.22*
NBR	0	0	98		91	
SBL	1	1700	171	.10*	86	.05*
SBT	1	1700	135	.08	123	.07
SBR	1	1700	244	.14	121	.07
EBL	1	1700	24	.01*	90	.05
EBT	3	5100	413	.10	813	.17*
EBR	0	0	92		58	
WBL	1	1700	113	.07	119	.07*
WBT	3	5100	1147	.22*	575	.11
WBR	d	1700	129	.08	155	.09
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .56

201 . Paseo Westpark at Main St.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	190	.11	43	.03
NBT	1	1700	185	.19*	281	.20*
NBR	0	0	146		58	
SBL	1	1700	139	.08*	47	.03*
SBT	1	1700	210	.12	126	.07
SBR	1	1700	121	.07	69	.04
EBL	1	1700	13	.01*	54	.03
EBT	2	3400	328	.10	716	.21*
EBR	d	1700	138	.08	114	.07
WBL	1	1700	94	.06	30	.02*
WBT	2	3400	964	.28*	268	.08
WBR	d	1700	123	.07	64	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .51

221 . Culver Dr. at Bryan Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	373	.11*	654	.19*
NBT	3	5100	724	.14	1553	.30
NBR	1	1700	223	.13	554	.33
SBL	2	3400	111	.03	133	.04
SBT	3	5100	2107	.41*	858	.17*
SBR	d	1700	283	.17	118	.07
EBL	2	3400	94	.03	206	.06*
EBT	1.5	5100	156	{.08}*	403	{.12}
EBR	1.5		370		431	{.11}
WBL	2	3400	563	.17*	261	.08
WBT	2	3400	584	.22	517	.19*
WBR	0	0	172		142	
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .82 .66

222 . Culver Dr. at Trabuco Rd.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	660	.13*	1908	.37*
NBR	f		1154		1386	
SBL	1	1700	583	.34*	300	.18*
SBT	3	5100	2341	.46	1209	.24
SBR	f		717		180	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	644	.19*	487	.14*
WBT	0	0	0		0	
WBR	2	3400	728	.21	801	.24
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .71 .74

223 . Culver Dr. at I-5 SB Ramps

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1161	.23	1847	.36*
NBR	f		240		300	
SBL	0	0	0		0	
SBT	3	5100	2020	.40*	1389	.27
SBR	f		380		260	
EBL	3	5100	769	.15*	1153	.23*
EBT	0	0	0		0	
EBR	2	3400	450	.13	891	.26
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .64

224 . Culver Dr. at Walnut Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	156	.05*	305	.09
NBT	3	5100	749	.15	1484	.29*
NBR	1	1700	246	.14	334	.20
SBL	2	3400	246	.07	383	.11*
SBT	3	5100	1830	.36*	1358	.27
SBR	1	1700	464	.27	262	.15
EBL	2	3400	313	.09*	578	.17*
EBT	2	3400	468	.14	533	.16
EBR	1	1700	189	.11	131	.08
WBL	2	3400	421	.12	341	.10
WBT	2	3400	731	.22*	603	.18*
WBR	1	1700	298	.18	228	.13
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .77 .80

225 . Culver Dr. at Deerfield Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	23	.01*	87	.03
NBT	3	5100	896	.18	1725	.34*
NBR	1	1700	97	.06	143	.08
SBL	2	3400	157	.05	141	.04*
SBT	3	5100	2085	.41*	1493	.29
SBR	1	1700	142	.08	212	.12
EBL	1	1700	161	.09*	324	.19*
EBT	1	1700	155	.09	136	.08
EBR	d	1700	102	.06	140	.08
WBL	1	1700	198	.12	78	.05
WBT	1	1700	115	.19*	61	.10*
WBR	0	0	205		101	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .75 .72

226 . Culver Dr. at ICD

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	265	.08*	270	.08
NBT	4	6800	640	.09	1427	.21*
NBR	f		156		394	
SBL	2	3400	185	.05	323	.10*
SBT	4	6800	1825	.27*	1260	.19
SBR	1	1700	310	.18	176	.10
EBL	2	3400	196	.06*	267	.08*
EBT	3	5100	739	.14	1063	.21
EBR	f		205		150	
WBL	2	3400	381	.11	240	.07
WBT	3	5100	1176	.23*	1034	.20*
WBR	f		114		206	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .64

227 . Culver Dr. at Warner Av.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	116	.07*	207	.12
NBT	3	5100	934	.18	1801	.35*
NBR	1	1700	63	.04	181	.11
SBL	1	1700	84	.05	98	.06*
SBT	3	5100	2193	.43*	1317	.26
SBR	d	1700	181	.11	225	.13
EBL	2	3400	214	.06	220	.06
EBT	2	3400	202	.06*	230	.07*
EBR	d	1700	193	.11	179	.11
WBL	1	1700	214	.13*	94	.06*
WBT	2	3400	354	.10	138	.04
WBR	d	1700	152	.09	118	.07
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .59

228 . Culver Dr. at Barranca Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	118	.03*	231	.07
NBT	3	5100	617	.12	1565	.31*
NBR	1	1700	305	.18	353	.21
SBL	2	3400	356	.10	280	.08*
SBT	3	5100	1934	.38*	1099	.22
SBR	f		301		191	
EBL	2	3400	407	.12*	323	.10*
EBT	2	3400	801	.24	689	.20
EBR	1	1700	171	.10	428	.25
WBL	2	3400	359	.11	246	.07
WBT	2	3400	833	.25*	639	.19*
WBR	d	1700	149	.09	314	.18
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .83 .73

229 . Culver Dr. at Alton Pkwy.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	125	.04*	244	.07
NBT	3	5100	841	.16	1866	.37*
NBR	1	1700	237	.14	330	.19
SBL	2	3400	125	.04	185	.05*
SBT	3	5100	1925	.38*	1037	.20
SBR	f		263		197	
EBL	2	3400	99	.03*	276	.08
EBT	2	3400	428	.13	814	.24*
EBR	1	1700	155	.09	269	.16
WBL	2	3400	430	.13	304	.09*
WBT	2	3400	922	.27*	629	.19
WBR	1	1700	170	.10	218	.13
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.77		.80

230 . Culver Dr. at Main St.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	181	.05*	120	.04
NBT	3	5100	993	.19	1903	.37*
NBR	1	1700	172	.10	508	.30
SBL	2	3400	51	.02	181	.05*
SBT	3	5100	1997	.39*	1416	.28
SBR	f		473		130	
EBL	2	3400	143	.04	520	.15
EBT	2	3400	126	.04*	452	.13*
EBR	f		122		168	
WBL	2	3400	551	.16*	169	.05*
WBT	2	3400	345	.10	80	.02
WBR	1	1700	85	.05	70	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.69		.65

231 . Culver Dr. at Paseo Westpark

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	133	.08*	149	.09
NBT	3	5100	1281	.25	2427	.48*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2569	.50*	1712	.34
SBR	d	1700	119	.07	51	.03
EBL	1	1700	65	.04*	43	.03*
EBT	0	0	0		0	
EBR	1	1700	224	.13	48	.03
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.03*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.70		.56

232 . Culver Dr. at I-405 NB Ramps

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	797	.16	1826	.36*
NBR	f		580		422	
SBL	0	0	0		0	
SBT	3	5100	1047	.21*	1091	.21
SBR	f		930		663	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	783	.23*	455	.13*
WBT	0	0	0		0	
WBR	1	1700	453	.27	784	.46
Right Turn Adjustment					WBR	.33*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.49		.87

233 . Culver Dr. at I-405 SB Ramps

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1055	.21	1462	.29*
NBR	f		242		651	
SBL	0	0	0		0	
SBT	3	5100	1531	.30*	1156	.23
SBR	f		253		301	
EBL	1.5		309	{.16}*	833	{.27}*
EBT	0	5100	0	.16	0	{.27}
EBR	1.5		520		597	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .51 .61

234 . Culver Dr. at Michelson Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	143	.04*	282	.08
NBT	3	5100	986	.20	1623	.33*
NBR	0	0	17		84	
SBL	2	3400	215	.06	639	.19*
SBT	3	5100	1549	.30*	807	.16
SBR	1	1700	260	.15	275	.16
EBL	2	3400	178	.05	300	.09
EBT	1	1700	139	.08*	197	.12*
EBR	1	1700	172	.10	193	.11
WBL	1	1700	113	.07*	202	.12*
WBT	2	3400	128	.04	165	.05
WBR	1	1700	229	.13	353	.21
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .81

235 . Culver Dr. at University Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	8	.00	59	.03
NBT	3	5100	1478	.29	1553	.30*
NBR	2	3400	264	.08	872	.26
SBL	1	1700	20	.01	29	.02*
SBT	3	5100	1229	.30*	1111	.28
SBR	0	0	287		292	
EBL	2	3400	49	.01	304	.09
EBT	3	5100	396	.08*	838	.17*
EBR	0	0	15		19	
WBL	2	3400	506	.15*	570	.17*
WBT	3	5100	875	.18	489	.10
WBR	0	0	23		43	
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .58 .71

337 . Von Karman Ave. at Quartz

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	430	.25*	202	.12*
NBT	2	3400	838	.25	1117	.33
NBR	1	1700	183	.11	62	.04
SBL	1	1700	163	.10	81	.05
SBT	2	3400	786	.23*	1092	.32*
SBR	d	1700	242	.14	97	.06
EBL	2	3400	41	.01*	192	.06*
EBT	1	1700	6	.00	7	.00
EBR	1	1700	63	.04	441	.26
WBL	1	1700	34	.02	57	.03
WBT	1	1700	21	.01*	12	.01*
WBR	f		54		161	
Right Turn Adjustment					EBR	.13*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .69

439 . Bixby at Michleson Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	12	.01*	26	.02*
NBT	1	1700	3	.00	2	.01
NBR	0	0	5		22	
SBL	2	3400	11	.00	87	.03
SBT	1	1700	5	.02*	3	.09*
SBR	0	0	25		149	
EBL	1	1700	116	.07*	73	.04*
EBT	2	3400	304	.10	600	.19
EBR	0	0	36		31	
WBL	1	1700	39	.02	66	.04
WBT	2	3400	303	.09*	685	.20*
WBR	1	1700	62	.04	25	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.24		.40

440 . Siglo at Main St.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	16	.00	172	.05*
SBT	0	0	0		0	
SBR	1	1700	14	.01	48	.03
EBL	2	3400	22	.01*	40	.01
EBT	3	5100	436	.09	2098	.41*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5100	1703	.33*	902	.18
WBR	1	1700	149	.09	20	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.39		.51

441 . Loop Rd. at Jamboree Rd. SB Ramps

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	5	.00	84	.02
NBR	1	1700	15	.01	62	.04
SBL	1	1700	15	.01	8	.00
SBT	2	3400	124	.04*	73	.02*
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		526	.15*	317	.09*
WBT	0	5100	0		0	
WBR	1.5		25		46	.03
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.24		.16

472 . Obsidian at Michelson Dr.

Y2015 No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	6		4	
NBT	1	1700	0	.01*	0	.01*
NBR	0	0	14		6	
SBL	0	0	8		118	{.07}*
SBT	1	1700	0	.00	0	.07
SBR	f		22		93	
EBL	1	1700	111	.07*	52	.03
EBT	2	3400	247	.08	666	.20*
EBR	0	0	10		5	
WBL	1	1700	10	.01	5	.00
WBT	2	3400	1043	.31*	543	.16
WBR	f		139		48	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.44		.33

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineNoProj\EXE-193\ICU\Y15NP-NPB01-102809

61 . Airport Wy. at Campus Dr.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	2	3200	345	.11	490	.15
EBL	1	1600	188	.12	303	.19*
EBT	3	4800	1220	.25*	880	.18
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	465	.13	1330	.32*
WBR	0	0	162		197	
Right Turn Adjustment			SBR	.11*	SBR	.15*
TOTAL CAPACITY UTILIZATION				.36		.66

62 . Campus Dr. at Bristol St. NB

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	688	.22	827	.26*
NBT	3	4800	1847	.38*	643	.13
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6400	301	.05	870	.14*
SBR	2	3200	290	.09	970	.30
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	249	.16	290	.18
WBT	4	6400	1161	.22*	2083	.34*
WBR	0	0	253		97	
Right Turn Adjustment					SBR	.16*
TOTAL CAPACITY UTILIZATION				.60		.90

63 . Campus Dr. at Bristol St. SB

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	5	8000	1273	.18*	891	.14*
NBR	0	0	188		259	.16
SBL	1	1600	178	.11*	229	.14*
SBT	3	4800	372	.08	961	.20
SBR	0	0	0		0	
EBL	1.5		1267	{.44}*	479	{.23}*
EBT	2.5	6400	1552	.44	992	.23
EBR	2	3200	481	.15	509	.16
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.02*
TOTAL CAPACITY UTILIZATION				.73		.53

64 . Birch St. at Bristol St. NB

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	146	.05	176	.06*
NBT	2	3200	1054	.33*	366	.11
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	1.5	6400	174	.05	606	.26*
SBR	2.5		136	.04	1048	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		520		544	
WBT	3.5	8000	1437	.30*	1386	.26*
WBR	0		443		154	
TOTAL CAPACITY UTILIZATION				.63		.58

65 . Birch St. at Bristol St. SB

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2.5	6400	354	.10*	322	.10
NBR	1.5		264		368	.12
SBL	2	3200	226	.07*	367	.11
SBT	2	3200	392	.12	793	.25*
SBR	0	0	0		0	
EBL	1.5		626	{.21}*	178	
EBT	3	8000	839	.21	1205	.19*
EBR	0.5		218		127	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .38 .44

84 . MacArthur Bl. at Campus Dr.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	72	.05	118	.07
NBT	4	6400	1076	.17*	1023	.16*
NBR	1	1600	107	.07	68	.04
SBL	1	1600	262	.16*	170	.11*
SBT	4	6400	1005	.16	1055	.16
SBR	1	1600	270	.17	697	.44
EBL	2	3200	403	.13*	353	.11*
EBT	3	4800	761	.16	552	.12
EBR	d	1600	101	.06	105	.07
WBL	2	3200	74	.02	110	.03
WBT	3	4800	378	.08*	1016	.21*
WBR	f		130		144	
Right Turn Adjustment					SBR	.24*

TOTAL CAPACITY UTILIZATION .54 .83

85 . MacArthur Bl. at Birch St.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	55	.03	121	.08*
NBT	3	4800	1895	.39*	1237	.26
NBR	f		109		24	
SBL	1	1600	136	.09*	75	.05
SBT	4	6400	788	.15	2162	.37*
SBR	0	0	184		179	
EBL	1.5		129	{.08}*	296	{.11}*
EBT	1.5	4800	375	.12	221	.11
EBR	0		65		25	
WBL	1	1600	27	.02	103	.06
WBT	2	3200	211	.07*	700	.22*
WBR	f		57		138	

TOTAL CAPACITY UTILIZATION .63 .78

105 . Von Karman Av. at Campus Dr.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	20	.01	79	.05*
NBT	2	3200	708	.22*	532	.17
NBR	f		61		149	
SBL	1	1600	45	.03*	188	.12
SBT	2	3200	486	.18	940	.38*
SBR	0	0	99		262	
EBL	1	1600	248	.16*	217	.14*
EBT	2	3200	413	.13	552	.17
EBR	f		48		61	
WBL	1	1600	96	.06	109	.07
WBT	2	3200	381	.15*	739	.25*
WBR	0	0	84		72	

TOTAL CAPACITY UTILIZATION .56 .82

106 . Von Karman Av. at Birch St.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	30	.02	71	.04*
NBT	2	3200	570	.20*	524	.19
NBR	0	0	59		76	
SBL	1	1600	61	.04*	35	.02
SBT	2	3200	340	.17	627	.26*
SBR	0	0	189		207	
EBL	1	1600	91	.06*	131	.08*
EBT	2	3200	211	.08	180	.07
EBR	0	0	47		30	
WBL	1	1600	75	.05	23	.01
WBT	2	3200	253	.09*	292	.11*
WBR	0	0	22		55	

TOTAL CAPACITY UTILIZATION .39 .49

107 . Von Karman Av. at MacArthur Bl.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	33	.02*	134	.08
NBT	2	3200	98	.03	205	.06*
NBR	f		28		181	
SBL	2	3200	114	.04	681	.21*
SBT	1	1600	160	.10*	101	.06
SBR	f		26		58	
EBL	1	1600	57	.04*	48	.03
EBT	3	4800	368	.08	898	.19*
EBR	f		155		54	
WBL	1	1600	95	.06	45	.03*
WBT	3	4800	1041	.22*	638	.13
WBR	f		725		147	

TOTAL CAPACITY UTILIZATION .38 .49

121 . Teller Av. at Campus Dr.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	6	.00	33	.02*
NBT	1	1600	27	.02	44	.03
NBR	1	1600	17	.01	74	.05
SBL	1	1600	11	.01	99	.06
SBT	1	1600	49	.06*	62	.09*
SBR	0	0	40		79	
EBL	1	1600	49	.03*	24	.02
EBT	2	3200	282	.09	888	.28*
EBR	f		28		18	
WBL	1	1600	53	.03	40	.03*
WBT	2	3200	634	.24*	378	.13
WBR	0	0	124		32	

TOTAL CAPACITY UTILIZATION .33 .42

147 . Jamboree Rd. at Campus Dr.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	176	.06*	84	.03
NBT	4	6400	1280	.21	1801	.34*
NBR	0	0	57		389	
SBL	2	3200	340	.11	346	.11*
SBT	3	4800	1726	.40*	1592	.36
SBR	0	0	188		146	
EBL	2	3200	104	.03	431	.13
EBT	2	3200	184	.06*	565	.18*
EBR	f		23		257	
WBL	2	3200	451	.14*	142	.04*
WBT	2	3200	495	.15	301	.09
WBR	1	1600	206	.13	259	.16
Right Turn Adjustment					WBR	.07*

TOTAL CAPACITY UTILIZATION .66 .74

148 . Jamboree Rd. at Birch St.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	148	.09*	122	.08*
NBT	3	4800	1404	.29	1770	.37
NBR	0	0	1		1	
SBL	1	1600	5	.00	1	.00
SBT	3	4800	1706	.36*	1769	.37*
SBR	f		492		158	
EBL	1.5		126	{.04}*	350	{.11}*
EBT	0.5	3200	2	.04	0	.11
EBR	f		24		131	
WBL	0	0	0		0	
WBT	1	1600	0	.00*	0	.00*
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .49 .56

149 . Jamboree Rd. at Fairchild Rd.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	8	.01	16	.01
NBT	3	4800	1636	.35*	1706	.36*
NBR	0	0	35		21	
SBL	2	3200	315	.10*	299	.09*
SBT	4	6400	1594	.25	1835	.29
SBR	d	1600	10	.01	3	.00
EBL	1	1600	1	.00	31	.02
EBT	1	1600	0	.00	10	.03*
EBR	0	0	1		39	
WBL	1	1600	6	.00	16	.01*
WBT	1	1600	2	.00*	11	.01
WBR	1	1600	314	.20	293	.18
Right Turn Adjustment			WBR	.20*	WBR	.16*

TOTAL CAPACITY UTILIZATION .65 .65

150 . Jamboree Rd. at MacArthur Bl.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	513	.16*	226	.07
NBT	3	4800	970	.20	1035	.22*
NBR	1	1600	237	.15	51	.03
SBL	2	3200	362	.11	589	.18*
SBT	3	4800	922	.19*	1221	.25
SBR	1	1600	196	.12	113	.07
EBL	2	3200	97	.03*	200	.06
EBT	3	4800	373	.08	1280	.27*
EBR	f		141		293	
WBL	2	3200	199	.06	306	.10*
WBT	3	4800	1725	.36*	651	.14
WBR	1	1600	556	.35	415	.26

TOTAL CAPACITY UTILIZATION .74 .77

151 . Jamboree Rd. at Bristol St. NB-SR73 NB Ramps

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	1017	.32*	752	.24
NBT	1.5	4800	1550	.48	2080	.65*
NBR	1.5		0		0	
SBL	0	0	0		0	
SBT	2.5	6400	590	.16*	1190	.30
SBR	1.5		403		728	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .48 .65

153 . Jamboree Rd. at Bristol St. SB

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	5	8000	2085	.27*	1919	.25*
NBR	0	0	64		100	
SBL	0	0	0		0	
SBT	3	4800	651	.14	1111	.23
SBR	0	0	0		0	
EBL	1.5		955	.30*	1036	{.40}*
EBT	1.5	4800	376	.24	901	.40
EBR	2	3200	1149	.36	1243	.39
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.06*		
TOTAL CAPACITY UTILIZATION				.63		.65

154 . Jamboree Rd. at Eastbluff Dr.-University Dr.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	79	.05	44	.03*
NBT	3	4800	1565	.33*	1418	.30
NBR	1	1600	220	.14	272	.17
SBL	2	3200	67	.02*	155	.05
SBT	3	4800	1335	.28	1994	.42*
SBR	1	1600	331	.21	457	.29
EBL	1.5		414	{.18}*	236	{.12}*
EBT	0.5	3200	123	.18	113	.12
EBR	0		35		30	
WBL	1.5		310		245	
WBT	1.5	4800	170	.10*	149	.08*
WBR	f		172		96	
TOTAL CAPACITY UTILIZATION				.63		.65

155 . Jamboree Rd. at Bison Av.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	1472	.31*	1692	.35
NBR	d	1600	190	.12	146	.09
SBL	2	3200	210	.07*	214	.07
SBT	3	4800	1627	.34	2115	.44*
SBR	1	1600	200	.13	120	.08
EBL	1	1600	127	.08*	68	.04
EBT	0	0	0		0	
EBR	1	1600	64	.04	33	.02
WBL	2	3200	129	.04	292	.09*
WBT	0	0	0		0	
WBR	2	3200	191	.06	220	.07
Right Turn Adjustment			WBR	.06*	Multi	.04*
TOTAL CAPACITY UTILIZATION				.52		.57

156 . Jamboree Rd. at Ford Rd.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	351	.11*	358	.11*
NBT	3	4800	1419	.32	1810	.43
NBR	0	0	115		237	
SBL	1	1600	62	.04	49	.03
SBT	3	4800	1579	.33*	2258	.47*
SBR	1	1600	139	.09	47	.03
EBL	1.5		220	{.10}*	62	.04
EBT	1.5	4800	243	.10	224	.07*
EBR	1	1600	280	.18	255	.16
WBL	1.5		181	.11	208	{.08}*
WBT	1.5	4800	400	.13*	165	.08
WBR	1	1600	42	.03	38	.02
Right Turn Adjustment			EBR	.06*	EBR	.09*
TOTAL CAPACITY UTILIZATION				.73		.82

176 . Fairchild Av. at MacArthur Bl.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	29	.02*	412	.26*
SBT	0	0	0		0	
SBR	1	1600	21	.01	179	.11
EBL	1	1600	270	.17*	37	.02
EBT	3	4800	711	.15	1708	.36*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	2479	.64*	1201	.27
WBR	0	0	570		103	

TOTAL CAPACITY UTILIZATION .83 .62

178 . MacArthur Bl. at Bison Av.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	219	.07	219	.07*
NBT	4	6400	2643	.41*	2532	.40
NBR	1	1600	159	.10	196	.12
SBL	2	3200	77	.02*	232	.07
SBT	4	6400	2083	.33	2847	.44*
SBR	1	1600	288	.18	354	.22
EBL	2	3200	238	.07	215	.07
EBT	2	3200	223	.07*	222	.07*
EBR	f		168		253	
WBL	2	3200	373	.12*	360	.11*
WBT	2	3200	224	.07	277	.09
WBR	1	1600	93	.06	133	.08

TOTAL CAPACITY UTILIZATION .62 .69

179 . MacArthur Bl. at Ford Rd.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	131	.04	62	.02
NBT	4	6400	2068	.32*	2423	.38*
NBR	f		85		486	
SBL	2	3200	562	.18*	840	.26*
SBT	4	6400	1946	.30	2437	.38
SBR	f		17		52	
EBL	2	3200	44	.01	30	.01
EBT	2	3200	283	.09*	334	.10*
EBR	1	1600	123	.08	66	.04
WBL	2	3200	531	.17*	248	.08*
WBT	2	3200	392	.12	305	.10
WBR	f		958		527	

TOTAL CAPACITY UTILIZATION .76 .82

194 . MacArthur Blvd. SB at University Dr.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	30	.02*	71	.04*
NBT	0	0	0		0	
NBR	1	1600	251	.16	119	.07
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	949	.21*	991	.22*
EBR	0	0	77		49	
WBL	2	3200	153	.05*	321	.10*
WBT	3	4800	880	.18	749	.16
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.14*	NBR	.03*

TOTAL CAPACITY UTILIZATION .42 .39

195 . SR-73 SB Ramps at University Dr.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	600	.38*	547	.34*
SBT	0	0	0		0	
SBR	1	1600	78	.05	173	.11
EBL	0	0	0		0	
EBT	3	4800	449	.09	619	.13*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	543	.11*	551	.11
WBR	0	0	0		0	
TOTAL CAPACITY UTILIZATION				.49		.47

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineNoProj\EXE-193\ICU\Y15NP-NPB02-102809

733 . Irvine Av. at Mesa Dr.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	83	.05	47	.03*
NBT	2	3200	854	.27*	639	.20
NBR	d	1600	270	.17	181	.11
SBL	1	1600	19	.01*	14	.01
SBT	2	3200	499	.16	1270	.40*
SBR	d	1600	57	.04	181	.11
EBL	1	1600	106	.07	41	.03
EBT	1	1600	194	.15*	116	.16*
EBR	0	0	51		134	
WBL	1	1600	203	.13*	437	.27*
WBT	1	1600	50	.03	422	.26
WBR	1	1600	14	.01	29	.02

TOTAL CAPACITY UTILIZATION .56 .86

734 . Irvine Av. at University Dr.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	113	.07	119	.07*
NBT	2	3200	1163	.36*	762	.24
NBR	1	1600	1	.00	24	.02
SBL	1	1600	98	.06*	42	.03
SBT	2	3200	611	.19	1620	.51*
SBR	1	1600	62	.04	121	.08
EBL	1	1600	147	.09*	83	.05*
EBT	1	1600	41	.03	33	.02
EBR	1	1600	112	.07	135	.08
WBL	1	1600	16	.01	46	.03
WBT	1	1600	14	.01*	29	.02*
WBR	d	1600	20	.01	35	.02
Right Turn Adjustment					EBR	.04*

TOTAL CAPACITY UTILIZATION .52 .69

741 . Jamboree Av. at San Joaquin Hills Rd.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	36	.02	62	.04
NBT	3	4800	1202	.25*	1629	.34*
NBR	f		102		145	
SBL	2	3200	704	.22*	547	.17*
SBT	3	4800	1270	.26	1881	.39
SBR	f		44		125	
EBL	1.5		279	.09*	171	.05*
EBT	1.5	4800	27	.02	38	.02
EBR	f		47		52	
WBL	1.5		186	.06	197	.06
WBT	1.5	4800	20	.01*	43	.03*
WBR	1	1600	83	.05	80	.05
Right Turn Adjustment			WBR	.04*	WBR	.02*

TOTAL CAPACITY UTILIZATION .61 .61

742 . MacArthur Blvd. at San Joaquin Hills Rd.

Y2015 No Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	140	.04*	115	.04
NBT	3	4800	1363	.28	1936	.40*
NBR	1	1600	205	.13	30	.02
SBL	2	3200	266	.08	554	.17*
SBT	3	4800	1787	.37*	1953	.41
SBR	f		470		250	
EBL	2	3200	450	.14*	578	.18*
EBT	3	4800	109	.03	406	.12
EBR	0	0	40		177	
WBL	1	1600	13	.01	50	.03
WBT	2	3200	430	.13*	315	.10*
WBR	f		546		536	

TOTAL CAPACITY UTILIZATION .68 .85

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineNoProj\EXE-193\ICU\Y15NP-SAN01-102809

4 . SR-55 SB Ramps at Edinger Av.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		434	{.14}*	321	
NBT	0.5	3400	58	.14	57	.11*
NBR	2	3400	408	.12	233	.07
SBL	1	1700	67	.04	152	.09*
SBT	1	1700	29	.04*	80	.08
SBR	0	0	33		49	
EBL	1	1700	42	.02	52	.03
EBT	3	5100	1064	.21*	1375	.27*
EBR	f		245		240	
WBL	2	3400	426	.13*	360	.11*
WBT	3	5100	1363	.29	990	.21
WBR	0	0	101		91	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .63

5 . Hotel Terrace Dr. at Dyer Rd.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		184	{.06}*	162	{.05}*
NBT	0.5	3400	12	.06	11	.05
NBR	2	3400	314	.09	87	.03
SBL	0.5		90		102	
SBT	1.5	3400	170	.08*	469	.17*
SBR	1	1700	40	.02	139	.08
EBL	1	1700	63	.04	129	.08
EBT	3	5100	1016	.20*	991	.19*
EBR	1	1700	331	.19	151	.09
WBL	2	3400	469	.14*	610	.18*
WBT	3	5100	856	.17	939	.18
WBR	1	1700	185	.11	49	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .64

6 . Grand Av. at Dyer Rd.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	465	.14*	691	.20*
SBT	0	0	0		0	
SBR	1	1700	445	.26	329	.19
EBL	1	1700	190	.11*	343	.20*
EBT	3	5100	1228	.24	927	.18
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	1106	.33*	1330	.39*
WBR	f		637		381	
Right Turn Adjustment			SBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .84

7 . SR-55 NB Ramps at Dyer Rd.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		828	{.30}*	233	.07*
NBT	0	5100	0	.30	0	
NBR	1.5		703		77	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1887	.37*	1103	.22
EBR	f		550		1020	
WBL	0	0	0		0	
WBT	2.5	5100	952	.26	1577	.46*
WBR	0.5		350		1250	.74
Right Turn Adjustment					WBR	.23*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .81

8 . SR-55 SB Ramps at MacArthur Blvd.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	877	.26*	299	.09*
SBT	0	0	0		0	
SBR	2	3400	951	.28	760	.22
EBL	0	0	0		0	
EBT	2	3400	1290	.38*	1261	.37*
EBR	f		753		980	
WBL	0	0	0		0	
WBT	3	5100	1297	.25	1740	.34
WBR	f		153		700	
Right Turn Adjustment					SBR	.11*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .62

9 . SR-55 NB Ramps at MacArthur Blvd.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1028	.30*	696	.20*
NBT	0	0	0		0	
NBR	f		696		254	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	1324	.39*	886	.26
EBR	f		620		760	
WBL	0	0	0		0	
WBT	3	5100	662	.13	1664	.33*
WBR	f		280		1160	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .58

28 . Pullman St. at Warner Av.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		64		146	
NBT	0.5	1700	17	.05*	9	.09*
NBR	1	1700	62	.04	96	.06
SBL	0	0	32	{.02}*	101	{.06}*
SBT	2	3400	18	.02	32	.05
SBR	0	0	12		118	.07
EBL	1	1700	62	.04	45	.03*
EBT	3	5100	1266	.28*	1373	.28
EBR	0	0	165		63	
WBL	1	1700	67	.04*	55	.03
WBT	3	5100	1325	.27	1566	.31*
WBR	0	0	72		26	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .44 .54

29 . Pullman St. at Barranca Pkwy.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	130	.04*	675	.20*
NBT	1	1700	23	.03	16	.05
NBR	0	0	29		69	
SBL	1	1700	36	.02	26	.02
SBT	0.5	3400	24	{.01}*	10	{.08}*
SBR	1.5		102		385	
EBL	1	1700	313	.18*	191	.11*
EBT	3	5100	1085	.30	899	.19
EBR	0	0	428		95	
WBL	1	1700	49	.03	55	.03
WBT	3	5100	888	.18*	1653	.33*
WBR	0	0	24		24	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .46 .77

543 . Bristol St. at Segerstrom Av.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	67	.04*	166	.10
NBT	3	5100	703	.14	1258	.25*
NBR	d	1700	170	.10	273	.16
SBL	1	1700	205	.12	162	.10*
SBT	3	5100	1085	.23*	901	.20
SBR	0	0	90		101	
EBL	1	1700	188	.11	223	.13*
EBT	2	3400	755	.24*	655	.25
EBR	0	0	66		206	
WBL	1	1700	159	.09*	193	.11
WBT	2	3400	543	.18	823	.27*
WBR	0	0	79		109	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.65		.80

544 . Bristol St. at MacArthur Blvd.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	102	.03*	451	.13
NBT	3	5100	617	.12	1379	.27*
NBR	1	1700	112	.07	333	.20
SBL	2	3400	225	.07	268	.08*
SBT	3	5100	1106	.24*	975	.22
SBR	0	0	138		169	
EBL	2	3400	207	.06	351	.10*
EBT	3	5100	1283	.25*	819	.16
EBR	1	1700	149	.09	162	.10
WBL	2	3400	155	.05*	353	.10
WBT	3	5100	1070	.21	1460	.29*
WBR	1	1700	136	.08	250	.15
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.62		.79

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineNoProj\EXE-193\ICU\Y15NP-SAN02-102809

719 . Flower St. at Segerstrom Av.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	105	.06	92	.05*
NBT	2	3400	524	.18*	344	.14
NBR	0	0	91		124	
SBL	1	1700	83	.05*	150	.09
SBT	2	3400	346	.12	713	.23*
SBR	0	0	61		77	
EBL	1	1700	92	.05	93	.05*
EBT	2	3400	849	.33*	606	.21
EBR	0	0	269		121	
WBL	1	1700	78	.05*	47	.03
WBT	2	3400	606	.19	921	.29*
WBR	0	0	46		73	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .67

720 . Flower St. at MacArthur Blvd.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	25	.01*	47	.03
NBT	2	3400	150	.06	556	.19*
NBR	0	0	66		77	
SBL	1	1700	134	.08	87	.05*
SBT	2	3400	267	.15*	182	.09
SBR	0	0	241		121	
EBL	1	1700	213	.13*	166	.10*
EBT	3	5100	1311	.26	1055	.22
EBR	0	0	39		51	
WBL	1	1700	43	.03	57	:03
WBT	3	5100	754	.16*	1912	.40*
WBR	0	0	67		139	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .50 .79

723 . Main St. at Dyer Rd.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	66	.04*	151	.09
NBT	2	3400	407	.12	969	.29*
NBR	1	1700	177	.10	390	.23
SBL	1	1700	203	.12	105	.06*
SBT	3	5100	967	.22*	543	.14
SBR	0	0	160		152	
EBL	1	1700	174	.10	124	.07*
EBT	2	3400	900	.26*	545	.16
EBR	1	1700	166	.10	61	.04
WBL	1	1700	147	.09*	157	.09
WBT	2	3400	744	.22	836	.25*
WBR	1	1700	99	.06	137	.08
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .72

724 . Main St. at Alton Pkwy.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	12	.01*	28	.02
NBT	3	5100	675	.14	1457	.29*
NBR	0	0	44		37	
SBL	1	1700	86	.05	64	.04*
SBT	3	5100	1184	.23*	662	.14
SBR	0	0	7		29	
EBL	0	0	0		0	
EBT	1	1700	0	.00	0	.00
EBR	0	0	0		0	
WBL	0.5		36		54	
WBT	0.5	1700	2	.02*	1	.03*
WBR	1	1700	35	.02	76	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .31 .41

725 . Main St. at MacArthur Blvd.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	48	.01	355	.10
NBT	3	5100	276	.05*	654	.13*
NBR	1	1700	207	.12	402	.24
SBL	2	3400	411	.12*	225	.07*
SBT	3	5100	612	.12	428	.08
SBR	1	1700	146	.09	298	.18
EBL	2	3400	264	.08	303	.09*
EBT	3	5100	1592	.31*	715	.14
EBR	1	1700	165	.10	62	.04
WBL	2	3400	303	.09*	231	.07
WBT	3	5100	786	.15	1332	.26*
WBR	1	1700	281	.17	396	.23
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .61

727 . Halladay St. at Dyer Rd.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	8	.00	39	.02
NBT	1	1700	16	.07*	93	.18*
NBR	0	0	95		218	
SBL	1	1700	252	.15*	156	.09*
SBT	1	1700	58	.09	45	.06
SBR	0	0	100		60	
EBL	1	1700	85	.05	136	.08*
EBT	3	5100	1123	.22*	1066	.21
EBR	0	0	12		8	
WBL	1	1700	170	.10*	87	.05
WBT	3	5100	712	.16	1091	.23*
WBR	0	0	129		101	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .63

728 . Halladay St. E at Alton Pkwy.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0.5		31		50	
SBT	0	1700	0	.16*	0	.09*
SBR	0.5		239		110	
EBL	1	1700	99	.06*	309	.18*
EBT	1	1700	51	.03	32	.02
EBR	0	0	0		0	
WBL	1	1700	0	.00	0	.00
WBT	1	1700	16	.01*	53	.03*
WBR	1	1700	34	.02	57	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .28 .35

729 . Halladay St. W at Alton Pkwy.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		2		25	
NBT	0.5	1700	0	.04*	0	.15*
NBR	0		70		236	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	1	1700	80	.07*	94	.06
EBR	0	0	33		6	
WBL	0.5		187	{.11}*	74	
WBT	0.5	1700	68	.15	95	.10*
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .27 .30

730 . Grand Av. at Warner Av.

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	161	.09	248	.15
NBT	3	5100	530	.15*	602	.15*
NBR	0	0	239		180	
SBL	1	1700	285	.17*	300	.18*
SBT	3	5100	481	.14	525	.15
SBR	0	0	274	.16	315	.19
EBL	2	3400	365	.11*	408	.12*
EBT	3	5100	976	.19	849	.17
EBR	1	1700	160	.09	152	.09
WBL	2	3400	179	.05	200	.06
WBT	2	3400	835	.25*	1130	.33*
WBR	1	1700	275	.16	380	.22
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .73 .83

731 . Grand Av. at SR-55 SB Ramps

Y2015 No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	810	.24*	730	.21*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	570	.11	710	.14
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	355	.21*	330	.19*
WBT	0	0	0		0	
WBR	1	1700	366	.22	240	.14
Right Turn Adjustment			WBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .51 .45

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineNoProj\EXE-193\ICU\Y15NP-TUS01-102809

3 . Newport Av. at Edinger Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	581	.17*	698	.21*
NBT	0	0	0		0	
NBR	2	3400	91	.03	115	.03
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1031	.20*	835	.16*
EBR	1	1700	986	.58	833	.49
WBL	1	1700	337	.20*	367	.22*
WBT	3	5100	1383	.27	882	.17
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.21*	EBR	.12*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .83 .76

14 . Walnut Av. at McFadden St.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	314	.09*	519	.15*
NBT	0	0	0		0	
NBR	1	1700	11	.01	89	.05
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	379	.21	541	.27*
EBR	0	0	348		377	
WBL	1	1700	32	.02	43	.03*
WBT	2	3400	786	.23*	451	.13
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .37 .50

18 . Newport Av. at Bryan Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	73	.04*	133	.08
NBT	3	5100	555	.11	1275	.26*
NBR	0	0	18		39	
SBL	1	1700	62	.04	120	.07*
SBT	3	5100	1789	.36*	1057	.21
SBR	0	0	42		27	
EBL	1	1700	11	.01*	39	.02
EBT	1	1700	24	.01	63	.04*
EBR	1	1700	76	.04	180	.11
WBL	1	1700	36	.02	57	.03*
WBT	1	1700	62	.04*	74	.04
WBR	1	1700	203	.12	385	.23
Right Turn Adjustment					WBR	.13*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .50 .58

19 . Newport Av. at Main St.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	107	.06*	168	.10*
NBT	3	5100	447	.10	1233	.26
NBR	0	0	48		109	
SBL	1	1700	85	.05	75	.04
SBT	3	5100	335	.10*	971	.22*
SBR	0	0	164		133	
EBL	1	1700	52	.03	156	.09*
EBT	2	3400	108	.03*	307	.09
EBR	1	1700	182	.11	196	.12
WBL	1	1700	253	.15*	226	.13
WBT	2	3400	239	.07	510	.15*
WBR	1	1700	10	.01	34	.02
Right Turn Adjustment			EBR	.03*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .42 .61

20 . Newport Av. at El Camino Real

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	228	.13*	246	.14
NBT	3	5100	710	.17	1174	.27*
NBR	0	0	139		192	
SBL	1	1700	87	.05	174	.10*
SBT	3	5100	1638	.32*	990	.21
SBR	0	0	19		75	
EBL	1	1700	9	.01	45	.03
EBT	1	1700	94	.06*	254	.15*
EBR	1	1700	337	.20	256	.15
WBL	1	1700	175	.10*	225	.13*
WBT	2	3400	173	.07	349	.14
WBR	0	0	61		111	
Right Turn Adjustment			EBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .70 .70

21 . Newport Av. at I-5 NB Ramps

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	261	.15*	315	.19*
NBT	3	5100	1190	.23	1950	.38
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1850	.44*	1230	.33*
SBR	0	0	399		445	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .64 .57

22 . Newport Av. at Nisson Rd.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1089	.23*	1667	.34*
NBR	0	0	63		72	
SBL	1	1700	195	.11*	229	.13*
SBT	3	5100	1590	.31	1092	.21
SBR	0	0	0		0	
EBL	1.5		371		409	
EBT	0.5	3400	61	.13*	45	.13*
EBR	1	1700	340	.20	547	.32
WBL	1	1700	30	.02*	69	.04*
WBT	0	0	0		0	
WBR	1	1700	110	.06	181	.11
Right Turn Adjustment			EBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .69

23 . Newport Av. at McFadden St.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	39	.02*	55	.03*
NBT	3	5100	781	.16	1195	.24
NBR	0	0	11		16	
SBL	1	1700	18	.01	40	.02
SBT	3	5100	1487	.44*	923	.27*
SBR	0	0	911	.54	432	
EBL	2	3400	319	.09*	544	.16*
EBT	0	0	1		10	
EBR	1	1700	63	.04	31	.02
WBL	0	0	0		0	
WBT	1	1700	0	.00*	0	.00*
WBR	0	0	0		0	
Right Turn Adjustment			SBR	.03*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .63 .51

24 . Newport Av. at Walnut Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	39	.02	121	.07
NBT	3	5100	678	.15*	875	.19*
NBR	0	0	93		109	
SBL	1	1700	620	.36*	449	.26*
SBT	3	5100	936	.19	607	.13
SBR	0	0	35		54	
EBL	1	1700	60	.04*	35	.02*
EBT	2	3400	220	.09	312	.11
EBR	0	0	89		73	
WBL	1	1700	138	.08	130	.08
WBT	2	3400	267	.16*	415	.24*
WBR	0	0	315	.19	530	.31
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.76		.76

25 . Newport Av. at Sycamore Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	221	.13*	355	.21
NBT	2	3400	285	.11	770	.29*
NBR	0	0	87		204	
SBL	1	1700	225	.13	279	.16*
SBT	3	5100	982	.22*	579	.13
SBR	0	0	125		103	
EBL	1	1700	237	.14*	97	.06*
EBT	1	1700	48	.09	32	.05
EBR	0	0	108		51	
WBL	0.5		171		128	
WBT	1.5	3400	144	.13*	247	.16*
WBR	0		128		175	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.67		.72

27 . Del Amo Av. at Edinger Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		64	{.02}*	227	{.07}*
NBT	0.5	3400	4	.02	0	.07
NBR	1	1700	259	.15	185	.11
SBL	0	0	0		0	
SBT	1	1700	0	.00*	0	.00*
SBR	0	0	0		0	
EBL	1	1700	13	.01*	7	.00
EBT	3	5100	985	.19	855	.17
EBR	d	1700	103	.06	81	.05
WBL	2	3400	208	.06	169	.05
WBT	3	5100	1331	.26*	1313	.26*
WBR	d	1700	0	.00	0	.00
Right Turn Adjustment		NBR		.05*		
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for NBR						
TOTAL CAPACITY UTILIZATION				.39		.38

35 . Red Hill Av. at Bryan Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	137	.08*	172	.10
NBT	2	3400	420	.12	787	.23*
NBR	1	1700	172	.10	110	.06
SBL	1	1700	92	.05	117	.07*
SBT	2	3400	828	.24*	452	.13
SBR	1	1700	73	.04	42	.02
EBL	1	1700	44	.03*	40	.02*
EBT	2	3400	396	.14	475	.18
EBR	0	0	88		135	
WBL	1	1700	135	.08	135	.08
WBT	2	3400	580	.21*	692	.25*
WBR	0	0	126		153	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.61		.62

36 . Red Hill Av. at El Camino Real

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	233	.07*	372	.11
NBT	3	5100	662	.13	806	.16*
NBR	1	1700	186	.11	396	.23
SBL	1	1700	89	.05	307	.18*
SBT	3	5100	1288	.26*	599	.13
SBR	0	0	42		50	
EBL	1	1700	92	.05	26	.02
EBT	1.5	5100	251	{.08}*	988	.29*
EBR	1.5		258		135	
WBL	1.5		475	{.15}*	386	{.23}*
WBT	1.5	5100	239	.15	948	.29
WBR	0		76		168	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.61		.91

37 . Red Hill Av. at Nisson Rd.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01*	16	.01
NBT	4	6800	829	.13	1485	.22*
NBR	0	0	28		38	
SBL	1	1700	123	.07	148	.09*
SBT	3	5100	1581	.31*	739	.14
SBR	d	1700	84	.05	54	.03
EBL	1	1700	219	.13*	220	.13*
EBT	1	1700	53	.05	134	.09
EBR	0	0	30		26	
WBL	1	1700	30	.02	55	.03
WBT	1	1700	39	.15*	99	.16*
WBR	0	0	213		175	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.65		.65

38 . Red Hill Av. at Walnut Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	99	.06*	198	.12
NBT	3	5100	371	.09	1547	.34*
NBR	0	0	111		170	
SBL	1	1700	102	.06	178	.10*
SBT	3	5100	1274	.28*	451	.13
SBR	0	0	133		189	
EBL	1	1700	155	.09	202	.12*
EBT	2	3400	384	.20*	342	.12
EBR	0	0	301		74	
WBL	2	3400	208	.06*	185	.05
WBT	2	3400	386	.16	523	.20*
WBR	0	0	157		171	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.65		.81

39 . Red Hill Av. at Sycamore Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	58	.03*	331	.19
NBT	3	5100	607	.13	1875	.39*
NBR	0	0	35		105	
SBL	1	1700	51	.03	116	.07*
SBT	3	5100	1704	.35*	659	.16
SBR	0	0	92		145	
EBL	1	1700	70	.04*	70	.04*
EBT	1	1700	24	.01	32	.02
EBR	1	1700	142	.08	118	.07
WBL	1	1700	103	.06	47	.03
WBT	1	1700	101	.06*	27	.02*
WBR	1	1700	73	.04	55	.03
Right Turn Adjustment			EBR	.02*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.55		.57

40 . Red Hill Av. at Edinger Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	104	.03*	254	.07
NBT	3	5100	238	.05	1553	.30*
NBR	1	1700	176	.10	493	.29
SBL	2	3400	156	.05	116	.03*
SBT	3	5100	1244	.24*	351	.07
SBR	1	1700	260	.15	153	.09
EBL	2	3400	160	.05	250	.07*
EBT	3	5100	698	.14*	702	.14
EBR	1	1700	273	.16	128	.08
WBL	2	3400	643	.19*	208	.06
WBT	3	5100	1136	.22	819	.16*
WBR	1	1700	92	.05	315	.19
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR EBR

TOTAL CAPACITY UTILIZATION .65 .61

41 . Red Hill Av. at Warner Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	443	.13*	640	.19
NBT	3	5100	385	.08	1719	.34*
NBR	1	1700	40	.02	99	.06
SBL	2	3400	36	.01	62	.02*
SBT	3	5100	1503	.29*	547	.11
SBR	1	1700	554	.33	349	.21
EBL	2	3400	222	.07*	303	.09*
EBT	3	5100	814	.16	1352	.27
EBR	1	1700	343	.20	280	.16
WBL	2	3400	39	.01	62	.02
WBT	3	5100	1418	.28*	1078	.21*
WBR	1	1700	69	.04	81	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .82 .71

55 . Browning Av. at Bryan Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	52	.03	62	.04
NBT	2	3400	300	.09*	535	.16*
NBR	d	1700	198	.12	36	.02
SBL	1	1700	99	.06*	46	.03*
SBT	2	3400	145	.04	95	.03
SBR	d	1700	66	.04	52	.03
EBL	1	1700	49	.03	50	.03
EBT	2	3400	678	.20*	1058	.31*
EBR	d	1700	53	.03	66	.04
WBL	1	1700	83	.05*	59	.03*
WBT	2	3400	173	.05	225	.07
WBR	1	1700	133	.08	125	.07
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .58

56 . Browning Av. at El Camino Real

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	110	.06*	27	.02*
SBT	0	0	0		0	
SBR	1	1700	248	.15	93	.05
EBL	0	0	164	{.10}*	182	{.11}*
EBT	2	3400	220	.11	353	.16
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1700	292	.17*	597	.35*
WBR	1	1700	16	.01	78	.05
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .39 .53

58 . Browning Av. at Walnut Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	183	.11*	98	.06*
SBT	0	0	0		0	
SBR	1	1700	137	.08	52	.03
EBL	1	1700	106	.06*	66	.04*
EBT	2	3400	717	.21	641	.19
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	563	.20*	1053	.43*
WBR	0	0	114		400	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .42 .58

92 . Tustin Ranch Rd. at Bryan Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	138	.08*	570	.34*
NBT	3	5100	539	.11	2146	.42
NBR	1	1700	63	.04	171	.10
SBL	1	1700	105	.06	90	.05
SBT	3	5100	2291	.45*	647	.13*
SBR	1	1700	121	.07	154	.09
EBL	2	3400	60	.02	101	.03*
EBT	2	3400	322	.09*	630	.19
EBR	1	1700	359	.21	180	.11
WBL	2	3400	299	.09*	184	.05
WBT	2	3400	211	.06	818	.24*
WBR	d	1700	51	.03	147	.09
Right Turn Adjustment			EBR	.04*		
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR EBR

TOTAL CAPACITY UTILIZATION .80 .79

93 . Tustin Ranch Rd. at El Camino Real

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	128	.04*	530	.16
NBT	3	5100	509	.10	2522	.49*
NBR	d	1700	114	.07	338	.20
SBL	2	3400	73	.02	142	.04*
SBT	3	5100	2757	.54*	845	.17
SBR	d	1700	118	.07	53	.03
EBL	1	1700	130	.08	80	.05
EBT	2	3400	122	.07*	280	.14*
EBR	0	0	528	.31	191	
WBL	1	1700	275	.16*	254	.15*
WBT	2	3400	154	.07	387	.21
WBR	0	0	81		329	
Right Turn Adjustment			EBR	.21*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION 1.07 .87

94 . Tustin Ranch Rd. at I-5 NB Ramps

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	314	.09*	626	.18*
NBT	3	5100	1029	.20	1897	.37
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2650	.52*	1066	.21*
SBR	f		56		494	
EBL	1.5		151	{.07}*	333	.10*
EBT	0	5100	0	{.07}	0	
EBR	1.5		300		234	{.00}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .73 .54

95 . Tustin Ranch Rd. at I-5 SB Ramps

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05*	169	.05
NBT	3	5100	1007	.20	1916	.38*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2413	.47*	1013	.20
SBR	d	1700	551	.32	302	.18
EBL	1.5		746	{.31}*	667	.20*
EBT	0	5100	0	{.31}	0	
EBR	1.5		883		412	{.11}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .88 .63

96 . Tustin Ranch Rd. at Walnut Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	59	.02	198	.06
NBT	3	5100	517	.10*	1312	.26*
NBR	d	1700	151	.09	240	.14
SBL	2	3400	940	.28*	340	.10*
SBT	3	5100	1663	.33	626	.12
SBR	d	1700	389	.23	274	.16
EBL	2	3400	289	.09	259	.08*
EBT	2	3400	749	.22*	440	.13
EBR	d	1700	142	.08	91	.05
WBL	2	3400	255	.08*	173	.05
WBT	2	3400	522	.15	669	.20*
WBR	d	1700	504	.30	498	.29
Right Turn Adjustment					WBR	.01*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .73 .70

109 . Myford Rd. at Bryan Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	23	.01	53	.03
NBT	2	3400	37	.01*	145	.06*
NBR	0	0	10		52	
SBL	1	1700	117	.07*	38	.02*
SBT	2	3400	124	.06	59	.03
SBR	0	0	80		53	
EBL	1	1700	40	.02*	60	.04*
EBT	2	3400	393	.12	640	.19
EBR	d	1700	19	.01	46	.03
WBL	1	1700	87	.05	65	.04
WBT	2	3400	957	.28*	874	.26*
WBR	d	1700	53	.03	75	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .43 .43

110 . Myford Rd. at El Camino Real

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	0	.00
NBT	2	3400	0	.00*	0	.00*
NBR	0	0	0		0	
SBL	1	1700	74	.04*	118	.07*
SBT	1	1700	2	.00	4	.00
SBR	1	1700	145	.09	72	.04
EBL	1	1700	25	.01*	102	.06*
EBT	2	3400	306	.09	650	.19
EBR	0	0	16		10	
WBL	1	1700	6	.00	20	.01
WBT	2	3400	375	.12*	687	.24*
WBR	0	0	25		130	
Right Turn Adjustment			SBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .26 .42

111 . Franklin Av. at Walnut Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	85	.05*	249	.15*
NBT	2	3400	10	.01	11	.01
NBR	0	0	18	.01	12	.01
SBL	1	1700	45	.03	61	.04
SBT	2	3400	13	.01*	10	.01*
SBR	0	0	159	.09	521	.31
EBL	1	1700	435	.26*	242	.14*
EBT	2	3400	947	.28	633	.19
EBR	d	1700	355	.21	132	.08
WBL	1	1700	72	.04	11	.01
WBT	2	3400	496	.15*	1513	.45*
WBR	d	1700	155	.09	66	.04
Right Turn Adjustment					SBR	.19*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.52		.99

445 . Tustin Ranch Rd. at Warner Av. N.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2.5	6800	244	{.06}	949	{.22}*
NBR	1.5		346		692	
SBL	2	3400	557	.16	338	.10*
SBT	3	5100	1303	.26*	436	.09
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2.5		633	.12*	314	.09*
WBT	0	6800	0		0	
WBR	1.5		278	{.02}	461	.14
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .43 .46

446 . Tustin Ranch Rd. at Warner Av. S.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	123	.04*	253	.07
NBT	3	5100	247	.05	727	.14*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	712	.14*	164	.03
SBR	2	3400	1217	.36	587	.17
EBL	2	3400	343	.10*	903	.27*
EBT	0	0	0		0	
EBR	1	1700	268	.16	336	.20
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			Multi	.17*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .50 .46

447 . Armstrong Av. at Valencia Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	45	.01*	103	.03*
NBT	1	1700	18	.01	105	.06
NBR	d	1700	8	.00	42	.02
SBL	1	1700	19	.01	17	.01
SBT	1	1700	115	.13*	49	.05*
SBR	0	0	108		44	
EBL	1	1700	27	.02*	71	.04*
EBT	2	3400	103	.03	261	.08
EBR	1	1700	71	.04	77	.05
WBL	2	3400	43	.01	25	.01
WBT	2	3400	357	.11*	213	.07*
WBR	0	0	14		24	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .32 .24

448 . Armstrong Av. at Warner Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	83	.02*	192	.06
NBT	2	3400	20	.01	78	.05*
NBR	0	0	17		76	
SBL	1	1700	21	.01	36	.02*
SBT	2	3400	51	.02*	37	.01
SBR	1	1700	99	.06	90	.05
EBL	1	1700	74	.04*	133	.08
EBT	3	5100	612	.12	1148	.23*
EBR	1	1700	165	.10	132	.08
WBL	1	1700	74	.04	41	.02*
WBT	3	5100	1288	.25*	828	.16
WBR	1	1700	26	.02	40	.02
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .39 .37

453 . Red Hill Ave. at Valencia Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	113	.03*	166	.05
NBT	3	5100	473	.09	2115	.41*
NBR	1	1700	77	.05	140	.08
SBL	2	3400	51	.02	73	.02*
SBT	3	5100	1966	.39*	596	.12
SBR	1	1700	192	.11	48	.03
EBL	1	1700	17	.01*	145	.09*
EBT	2	3400	192	.06	340	.10
EBR	1	1700	21	.01	72	.04
WBL	2	3400	105	.03	81	.02
WBT	2	3400	450	.13*	324	.10*
WBR	1	1700	63	.04	98	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .67

454 . Tustin Ranch Rd. at Valencia Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	150	.04*	183	.05
NBT	3	5100	364	.07	1174	.23*
NBR	1	1700	6	.00	44	.03
SBL	2	3400	51	.02	107	.03*
SBT	3	5100	1733	.34*	677	.13
SBR	1	1700	305	.18	112	.07
EBL	2	3400	93	.03*	334	.10*
EBT	1	1700	2	.00	19	.01
EBR	1	1700	55	.03	79	.05
WBL	1	1700	62	.04	24	.01
WBT	2	3400	65	.02*	24	.01*
WBR	1	1700	53	.03	52	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .48 .42

455 . North Loop Rd. at Edinger Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	69	.04*	114	.07*
NBT	1	1700	1	.00	1	.00
NBR	1	1700	9	.01	10	.01
SBL	1	1700	1	.00	1	.00
SBT	1	1700	1	.00*	1	.00*
SBR	1	1700	1	.00	1	.00
EBL	1	1700	1	.00	1	.00
EBT	3	5100	145	.03*	3	.00*
EBR	0	0	0		0	
WBL	1	1700	124	.07*	120	.07*
WBT	3	5100	3	.00	86	.02
WBR	1	1700	1	.00	1	.00
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .19 .19

456 . North Loop Rd. at Valencia Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	123	.07*	53	.03*
NBT	1	1700	55	.03	76	.04
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	1	1700	104	.06*	84	.05*
SBR	1	1700	27	.02	27	.02
EBL	1	1700	5	.00	44	.03*
EBT	0	0	0		0	
EBR	1	1700	46	.03	96	.06
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					EBR	.01*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .18 .17

457 . North Loop Rd. at Moffett Dr.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	17	.01	29	.01*
NBR	1	1700	3	.00	65	.04
SBL	1	1700	18	.01	65	.04*
SBT	2	3400	62	.02*	29	.01
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	43	.03*	21	.01*
WBT	0	0	0		0	
WBR	1	1700	78	.05	21	.01
Right Turn Adjustment			WBR	.01*	NBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .11 .13

478 . Red Hill Ave. at I-5 NB Ramps

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	439	.26*	475	.28*
NBT	3	5100	873	.17	1089	.21
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1493	.29*	788	.15*
SBR	1	1700	589	.35	295	.17
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		347		362	
WBT	0.5	3400	2	.10*	39	.12*
WBR	1	1700	247	.15	411	.24
Right Turn Adjustment			SBR	.06*	SBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .62

479 . Red Hill Ave. at I-5 SB Ramps

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1041	.15*	1106	.16*
NBR	1	1700	611	.36	444	.26
SBL	1	1700	482	.28*	386	.23*
SBT	3	5100	1376	.27	764	.15
SBR	0	0	0		0	
EBL	0.5		254	{.15}*	454	{.27}*
EBT	0.5	1700	0	.15	0	.27
EBR	1	1700	516	.30	306	.18
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			Multi	.24*	NBR	.10*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .87 .81

480 . Tustin Ranch Rd. at Edinger Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01*	68	.04*
NBT	0	0	0		0	
NBR	1	1700	2	.00	1	.00
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	188	.04*	3	.00
EBR	1	1700	236	.14	226	.13
WBL	2	3400	14	.00	44	.01
WBT	3	5100	60	.01	182	.04*
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.09*	EBR	.07*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .19 .20

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineNoProj\EXE-193\ICU\Y15NP-TUS02-102809

732 . Newport Av. at SR-55 NB Ramps

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	68	.02*	409	.12*
NBT	3	5100	324	.10	734	.16
NBR	0	0	201	.12	102	
SBL	1	1700	0	.00	41	.02
SBT	2	3400	887	.26*	309	.09*
SBR	1	1700	498	.29	1063	.63
EBL	2	3400	485	.14*	400	.12*
EBT	1.5	3400	362	.11	48	.02
EBR	0.5		21		36	
WBL	1	1700	28	.02	78	.05
WBT	2	3400	102	.04*	220	.08*
WBR	0	0	21		40	
Right Turn Adjustment					SBR	.45*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.51		.91

739 . Newport Av. at Mitchell Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	14	.01*	10	.01
NBT	3	5100	973	.23	1375	.31*
NBR	0	0	218		182	
SBL	1	1700	108	.06	199	.12*
SBT	3	5100	1950	.40*	1193	.26
SBR	0	0	67		140	
EBL	1	1700	131	.08*	96	.06*
EBT	1	1700	63	.05	39	.03
EBR	0	0	18		15	
WBL	1	1700	172	.10	182	.11
WBT	1	1700	49	.08*	70	.16*
WBR	0	0	86		199	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.62		.70

740 . Red Hill Ave. at Mitchell Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	34	.02	178	.10
NBT	3	5100	1595	.33*	1301	.28*
NBR	0	0	83		110	
SBL	1	1700	273	.16*	120	.07*
SBT	3	5100	1183	.27	782	.17
SBR	0	0	191		105	
EBL	0.5		45		120	{.07}*
EBT	0.5	1700	32	.05*	100	.13
EBR	1	1700	13	.01	51	.03
WBL	0.5		17	{.01}*	17	
WBT	0.5	1700	20	.02	117	.08*
WBR	1	1700	73	.04	98	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.60		.55

743 . Newport Avenue at Valencia Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	0	.00
NBT	1	1700	122	.07	509	.30*
NBR	d	1700	15	.01	49	.03
SBL	2	3400	563	.17	359	.11*
SBT	1	1700	668	.39*	259	.15
SBR	d	1700	0	.00	5	.00
EBL	1	1700	4	.00	5	.00
EBT	1	1700	5	.00*	4	.00*
EBR	d	1700	1	.00	8	.00
WBL	1	1700	66	.04*	42	.02*
WBT	1	1700	10	.01	5	.00
WBR	2	3400	447	.13	642	.19
Right Turn Adjustment					WBR	.09*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.48		.57

745 . Tustin Ranch Rd. at Park Ave.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	28	.01*	37	.01*
NBT	3	5100	111	.02	278	.05
NBR	1	1700	2	.00	5	.00
SBL	2	3400	27	.01	21	.01
SBT	3	5100	537	.11*	258	.05*
SBR	1	1700	404	.24	209	.12
EBL	2	3400	143	.04*	487	.14*
EBT	2	3400	21	.01	64	.02
EBR	1	1700	47	.03	79	.05
WBL	1	1700	36	.02	33	.02
WBT	1	1700	238	.14*	246	.14*
WBR	1	1700	106	.06	210	.12
Right Turn Adjustment			SBR	.10*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .39

746 . Kensington Park at Edinger Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	23	.01*	70	.02*
NBT	0	0	0		0	
NBR	1	1700	17	.01	70	.04
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1483	.29	2340	.46*
EBR	1	1700	77	.05	29	.02
WBL	2	3400	93	.03	21	.01*
WBT	3	5100	2437	.48*	1640	.32
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .55

747 . Kensington Park at Valencia Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	17	{.01}*	31	{.02}*
NBT	0	0	7		46	
NBR	0	0	16		93	
SBL	2	3400	27	.01	16	.00
SBT	0	0	75		8	
SBR	2	3400	28	.01	6	.00
EBL	2	3400	5	.00	16	.00
EBT	2	3400	96	.04	291	.09*
EBR	0	0	30		16	
WBL	0	0	106		36	{.02}*
WBT	2	3400	365	.14*	223	.08
WBR	1	1700	17	.01	38	.02
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .21 .18

748 . Armstrong Av. at A Street

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	95	.06*	109	.06*
NBT	2	3400	75	.02	220	.06
NBR	d	1700	52	.03	102	.06
SBL	1	1700	53	.03	53	.03
SBT	2	3400	208	.06*	139	.04*
SBR	d	1700	101	.06	58	.03
EBL	2	3400	29	.01*	91	.03
EBT	1	1700	185	.11	388	.23*
EBR	d	1700	78	.05	111	.07
WBL	1	1700	94	.06	82	.05*
WBT	1	1700	414	.24*	316	.19
WBR	d	1700	36	.02	71	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .42 .43

749 . Park Avenue at A Street

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	77	.02*	116	.03*
NBT	1	1700	25	.01	39	.02
NBR	d	1700	48	.03	205	.12
SBL	1	1700	2	.00	8	.00
SBT	1	1700	14	.01*	17	.01*
SBR	d	1700	4	.00	5	.00
EBL	1	1700	11	.01	10	.01
EBT	2	3400	170	.05*	427	.13*
EBR	d	1700	120	.07	103	.06
WBL	1	1700	206	.12*	140	.08*
WBT	2	3400	460	.14	349	.10
WBR	d	1700	14	.01	11	.01
Right Turn Adjustment					NBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.25		.32

750 . Legacy Road at Warner Avenue

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	0	.00
NBT	2	3400	0	.00*	0	.00*
NBR	1	1700	0	.00	0	.00
SBL	1	1700	9	.01*	18	.01*
SBT	2	3400	2	.00	2	.00
SBR	1	1700	43	.03	66	.04
EBL	2	3400	53	.02*	68	.02
EBT	3	5100	551	.11	1118	.22*
EBR	1	1700	1	.00	1	.00
WBL	2	3400	2	.00	2	.00
WBT	3	5100	1327	.26*	836	.16
WBR	1	1700	27	.02	14	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.34		.28

751 . Tustin Ranch Rd. at Legacy Road

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	17	.01*	22	.01
NBT	3	5100	493	.10	1320	.26*
NBR	1	1700	25	.01	42	.02
SBL	2	3400	31	.01	41	.01*
SBT	3	5100	1775	.35*	725	.14
SBR	1	1700	28	.02	21	.01
EBL	1	1700	10	.01	26	.02*
EBT	2	3400	4	.00*	8	.00
EBR	1	1700	26	.02	17	.01
WBL	1	1700	39	.02*	28	.02
WBT	2	3400	5	.00	7	.00*
WBR	1	1700	16	.01	45	.03
Right Turn Adjustment			EBR	.01*	WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.44		.36

752 . Legacy Road at North Loop Road

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	35	.02*	14	.01*
NBT	2	3400	21	.01	12	.00
NBR	d	1700	4	.00	5	.00
SBL	1	1700	3	.00	8	.00
SBT	2	3400	4	.00*	21	.01*
SBR	d	1700	23	.01	23	.01
EBL	1	1700	13	.01*	23	.01
EBT	1	1700	23	.01	87	.05*
EBR	1	1700	4	.00	25	.01
WBL	1	1700	2	.00	4	.00
WBT	1	1700	92	.05*	44	.03
WBR	d	1700	6	.00	4	.00
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.13		.12

753 . Tustin Ranch Rd. at Edinger Av.

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	542	.11	1570	.31*
NBR	1	1700	2	.00	28	.02
SBL	1	1700	18	.01	32	.02*
SBT	3	5100	2009	.39*	820	.16
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	81	.02*	83	.02*
WBT	0	0	0		0	
WBR	1	1700	178	.10	187	.11
Right Turn Adjustment					WBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.46		.47

754 . Red Hill Ave. at Carnegie

Y2015 No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	107	.06*	24	.01
NBT	3	5100	547	.11	2119	.42*
NBR	1	1700	88	.05	125	.07
SBL	2	3400	137	.04	98	.03*
SBT	3	5100	1298	.25*	749	.15
SBR	d	1700	118	.07	10	.01
EBL	1	1700	7	.00	122	.07
EBT	1	1700	121	.07	345	.20*
EBR	1	1700	8	.00	59	.03
WBL	1	1700	53	.03	75	.04*
WBT	0.5	3400	428	.25*	209	{.12}
WBR	1.5		86		217	{.11}
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.61		.74

Appendix B-4 **2015 Cumulative Baseline With Project ICU Worksheets**

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineWProj\EXE-193\ICU\Y15WP-COM01-102909

10 . SR-55 Frontage Rd. SB at Paularino Av.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	573		118	
SBT	2	3200	721	.47*	612	.32*
SBR	0	0	202		289	
EBL	0	0	0		0	
EBT	2	3200	867	.31*	464	.18*
EBR	0	0	136		118	
WBL	1	1600	73	.05*	214	.13*
WBT	2	3200	198	.06	685	.21
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .83 .63

11 . SR-55 Frontage Rd. NB at Paularino Av.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	91		123	
NBT	2	3200	645	.23*	693	.26*
NBR	d	1600	137	.09	84	.05
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	1	1600	323	.20	225	.14*
EBT	2	3200	1113	.35*	396	.12
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	179	.11	767	.40*
WBR	0	0	232	.15	502	

TOTAL CAPACITY UTILIZATION .58 .80

12 . SR-55 Frontage Rd. SB at Baker St.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	503	{.31}*	221	
SBT	2	3200	117	.23	305	.26*
SBR	0	0	251	.16	463	.29
EBL	0	0	0		0	
EBT	2	3200	1287	.40*	639	.20*
EBR	1	1600	224	.14	432	.27
WBL	1	1600	69	.04*	243	.15*
WBT	2	3200	519	.16	1077	.34
WBR	0	0	0		0	
Right Turn Adjustment					Multi	.09*

TOTAL CAPACITY UTILIZATION .75 .70

13 . SR-55 Frontage Rd. NB at Baker St.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	341		351	
NBT	2	3200	305	.30*	375	.33*
NBR	0	0	344	.22	345	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	1	1600	524	.33*	285	.18*
EBT	2	3200	1226	.38	495	.15
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	319	.10*	1009	.32*
WBR	1	1600	181	.11	400	.25
Right Turn Adjustment			WBR	.01*		

TOTAL CAPACITY UTILIZATION .74 .83

50 . Red Hill Av. at Paularino Av.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	31	.01*	252	.08*
NBT	2	3200	123	.05	748	.24
NBR	0	0	25		18	
SBL	1	1600	84	.05	7	.00
SBT	2	3200	685	.24*	1033	.43*
SBR	0	0	85		352	
EBL	1	1600	109	.07	195	.12*
EBT	2	3200	985	.36*	84	.05
EBR	0	0	175		90	.06
WBL	1	1600	63	.04*	80	.05
WBT	2	3200	355	.12	499	.17*
WBR	0	0	28		50	

TOTAL CAPACITY UTILIZATION .65 .80

51 . Red Hill Av. at Baker St.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	214	.07	335	.10*
NBT	2	3200	760	.26*	625	.20
NBR	0	0	66		14	
SBL	1	1600	39	.02*	11	.01
SBT	2	3200	476	.20	770	.39*
SBR	0	0	166		471	
EBL	1.5		641	{.22}*	529	.17*
EBT	1.5	4800	405	.22	145	.09
EBR	1	1600	283	.18	99	.06
WBL	1	1600	4	.00	81	.05
WBT	2	3200	63	.02*	384	.13*
WBR	0	0	13		47	

TOTAL CAPACITY UTILIZATION .52 .79

52 . Red Hill Av. at Bristol St.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	143	.04	98	.03*
NBT	1.5	4800	388	.12*	156	.05
NBR	1.5		53		26	
SBL	2	3200	211	.07*	430	.13
SBT	2	3200	161	.05	600	.19*
SBR	1	1600	40	.03	271	.17
EBL	2	3200	307	.10*	135	.04*
EBT	3	4800	646	.13	705	.15
EBR	1	1600	63	.04	140	.09
WBL	2	3200	66	.02	139	.04
WBT	2.5	6400	547	{.15}*	1066	.22*
WBR	1.5		506		215	.13

TOTAL CAPACITY UTILIZATION .44 .48

541 . Bear St. at Baker St.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	92	.06	256	.16*
NBT	1	1600	150	.12*	255	.18
NBR	0	0	41		40	
SBL	2	3200	258	.08*	203	.06
SBT	1	1600	208	.13	233	.15*
SBR	2	3200	301	.09	507	.16
EBL	2	3200	493	.15	313	.10*
EBT	2	3200	941	.36*	727	.28
EBR	0	0	201		154	
WBL	1	1600	60	.04*	63	.04
WBT	2	3200	408	.13	1367	.43*
WBR	1	1600	117	.07	142	.09

TOTAL CAPACITY UTILIZATION .60 .84

542 . Bear St. at Paularino Av.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	115	.07*	29	.02
NBT	3	4800	876	.18	1553	.36*
NBR	0	0	11		172	
SBL	1	1600	44	.03	122	.08*
SBT	3	4800	741	.21*	867	.19
SBR	0	0	262		26	
EBL	1	1600	147	.09*	21	.01
EBT	1	1600	15	.04	6	.03*
EBR	0	0	48		43	
WBL	1	1600	11	.01	160	.10*
WBT	1	1600	43	.03*	25	.02
WBR	1	1600	86	.05	206	.13

TOTAL CAPACITY UTILIZATION .40 .57

545 . Bristol St. at Sunflower Av.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	176	.06*	588	.18
NBT	3	4800	814	.17	1641	.34*
NBR	1	1600	312	.20	180	.11
SBL	2	3200	239	.07	149	.05*
SBT	3	4800	962	.20*	959	.20
SBR	1	1600	112	.07	231	.14
EBL	2	3200	106	.03	337	.11
EBT	2.5	6400	1159	{.25}*	1173	{.24}*
EBR	1.5		538		430	{.13}
WBL	2	3200	260	.08*	283	.09*
WBT	3	4800	302	.06	513	.11
WBR	1	1600	190	.12	284	.18

TOTAL CAPACITY UTILIZATION .59 .72

546 . Bristol St. at Anton Blvd.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	62	.02	476	.15
NBT	4	6400	1182	.18*	2101	.33*
NBR	f		1091		586	
SBL	2	3200	214	.07*	204	.06*
SBT	4	6400	1356	.21	1430	.22
SBR	1	1600	15	.01	54	.03
EBL	1	1600	7	.00	58	.04
EBT	1	1600	18	.01*	40	.03*
EBR	1	1600	5	.00	112	.07
WBL	3	4800	303	.06*	939	.20*
WBT	1	1600	13	.01	100	.06
WBR	1	1600	94	.06	290	.18

TOTAL CAPACITY UTILIZATION .32 .62

547 . Bristol St. at Paularino Av.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	26	.02	103	.06*
NBT	3	4800	992	.22*	1242	.28
NBR	0	0	84		106	
SBL	2	3200	374	.12*	285	.09
SBT	3	4800	893	.19	1537	.34*
SBR	0	0	22		95	
EBL	1	1600	199	.12	123	.08*
EBT	1	1600	322	.22*	179	.14
EBR	0	0	24		47	
WBL	1	1600	53	.03*	179	.11
WBT	1	1600	132	.08	492	.31*
WBR	1	1600	189	.12	339	.21

TOTAL CAPACITY UTILIZATION .59 .79

548 . Bristol St. at Baker St.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	85	.03	182	.06
NBT	3	4800	467	.10*	875	.18*
NBR	1	1600	208	.13	163	.10
SBL	2	3200	304	.10*	284	.09*
SBT	3	4800	561	.12	900	.19
SBR	1	1600	134	.08	496	.31
EBL	2	3200	239	.07	268	.08*
EBT	2	3200	951	.32*	513	.19
EBR	0	0	69		109	
WBL	2	3200	170	.05*	271	.08
WBT	2	3200	353	.11	902	.28*
WBR	1	1600	297	.19	437	.27
Right Turn Adjustment					SBR	.04*

TOTAL CAPACITY UTILIZATION .57 .67

549 . Bristol St. at Newport Blvd. SB

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	215	.07*	609	.19*
NBT	3	4800	880	.18	1270	.26
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	750	.16*	730	.15*
SBR	d	1600	315	.20	511	.32
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			SBR	.04*	SBR	.17*

TOTAL CAPACITY UTILIZATION .27 .51

550 . Bristol St. at Newport Blvd. NB

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	749	.16*	1329	.28*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	681	.14	771	.16
SBR	0	0	0		0	
EBL	1.5		321	{.13}*	391	.12*
EBT	0	4800	0	{.13}	0	
EBR	1.5		329		209	{.04}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .29 .40

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineWProj\EXE-193\ICU\Y15WP-COM02-102909

715 . Bristol St. at I-405 NB Ramps

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6400	1729	.27*	2052	.32*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	5	8000	1733	.22	2232	.29
SBR	0	0	15		63	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	2	3200	49	.02	318	.10
WBL	1.5		106		214	
WBT	1.5	4800	65	.04*	318	.11*
WBR	2	3200	612	.19	882	.28
Right Turn Adjustment			WBR	.15*	Multi	.25*
TOTAL CAPACITY UTILIZATION				.46		.68

716 . Bristol St. at I-405 SB Ramps

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	161	.10*	218	.14*
NBT	4	6400	1219	.19	2100	.33
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	1001	.21*	1678	.35*
SBR	f		859		1214	
EBL	3	4800	701	.15*	644	.13*
EBT	0	0	0		0	
EBR	1	1600	529	.33	195	.12
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.10*		
TOTAL CAPACITY UTILIZATION				.56		.62

717 . Bear St. at SR-73 SB Ramps

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3200	451	.28*	934	.37*
NBR	0	0	429		244	
SBL	2	3200	571	.18*	976	.31*
SBT	2	3200	509	.16	1186	.37
SBR	0	0	0		0	
EBL	1.5		119	.07*	226	{.13}*
EBT	0	3200	0		0	.13
EBR	0.5		221	.14	194	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
TOTAL CAPACITY UTILIZATION				.53		.81

718 . Bear St. at SR-73 NB Ramps

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	120	.08*	337	.21*
NBT	2	3200	391	.12	621	.19
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	848	.20*	1099	.29*
SBR	0	0	101		283	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	137	.09*	261	.16*
WBT	0	0	0		0	
WBR	2	3200	473	.15	1059	.33
TOTAL CAPACITY UTILIZATION				.37		.66

721 . Flower St. at Sunflower Av.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	27	.02*	47	.03
NBT	2	3200	58	.02	359	.11*
NBR	1	1600	35	.02	64	.04
SBL	1	1600	127	.08	53	.03*
SBT	2	3200	188	.10*	143	.09
SBR	0	0	117		184	.12
EBL	2	3200	58	.02	233	.07*
EBT	3	4800	667	.15*	663	.15
EBR	0	0	39		64	
WBL	2	3200	53	.02*	53	.02
WBT	3	4800	366	.09	1049	.24*
WBR	0	0	44		79	

TOTAL CAPACITY UTILIZATION .29 .45

722 . Anton Blvd. at Sunflower Av.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	11	.01*	9	.01*
NBT	0	0	0		0	
NBR	2	3200	220	.07	545	.17
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	970	.21*	765	.16*
EBR	0	0	33		21	
WBL	1	1600	297	.19*	349	.22*
WBT	3	4800	489	.10	1321	.28
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .41 .39

726 . Main St. at Sunflower Av.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	435	.14*	1060	.33*
NBT	3	4800	286	.06	880	.18
NBR	0	0	3		1	
SBL	1	1600	9	.01	1	.00
SBT	2	3200	522	.16*	350	.11*
SBR	1	1600	278	.17	580	.36
EBL	1.5		477	{.15}*	580	{.18}*
EBT	0.5	3200	0	.15	0	.18
EBR	2	3200	743	.23	600	.19
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.11*

TOTAL CAPACITY UTILIZATION .45 .73

735 . Newport Blvd. NB at Del Mar Av./University Dr.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		102		116	
NBT	2.5	4800	1146	.26*	739	.18*
NBR	1	1600	81	.05	104	.07
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	861	.27*	572	.18*
EBT	2	3200	309	.10	428	.13
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	208	.07*	245	.08*
WBR	1	1600	352	.22	205	.13
Right Turn Adjustment			WBR	.15*	WBR	.05*

TOTAL CAPACITY UTILIZATION .75 .49

736 . Newport Blvd. SB at Del Mar Av./University

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	145	.09	278	.17
SBT	3	4800	472	.10*	1263	.26*
SBR	f		489		1149	
EBL	0	0	0		0	
EBT	4	6400	955	.16*	682	.11*
EBR	0	0	37		48	
WBL	1	1600	111	.07*	69	.04*
WBT	2	3200	211	.07	291	.09
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .33 .41

737 . Newport Blvd. NB at Mesa Dr.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	17	.01	18	.01
NBT	2	3200	431	.19*	371	.15*
NBR	0	0	183		101	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	62	.02*	61	.02*
EBT	1	1600	157	.10	279	.17
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1600	93	.09*	292	.21*
WBR	0	0	57		48	

TOTAL CAPACITY UTILIZATION .30 .38

738 . Newport Blvd. SB at Mesa Dr.

Y2015 WITH Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	210	.13	340	.21
SBT	4	6400	1010	.16*	2370	.37*
SBR	1	1600	0	.00	0	.00
EBL	0	0	0		0	
EBT	1	1600	0	.00*	0	.00*
EBR	1	1600	0	.00	0	.00
WBL	1	1600	100	.06*	310	.19*
WBT	1	1600	0	.00	0	.00
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .22 .56

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineWProj\EXE-193\ICU\Y15WP-IRV01-102909

42 . Red Hill Av. at Barranca Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	247	.07*	714	.21
NBT	4	6800	416	.06	1738	.26*
NBR	d	1700	87	.05	226	.13
SBL	2	3400	415	.12	349	.10*
SBT	4	6800	1048	.15*	497	.07
SBR	d	1700	175	.10	144	.08
EBL	2	3400	202	.06	212	.06
EBT	4	6800	1108	.21*	878	.15*
EBR	0	0	308		170	
WBL	2	3400	394	.12*	137	.04*
WBT	4	6800	767	.11	811	.12
WBR	1	1700	222	.13	472	.28
Right Turn Adjustment					WBR	.07*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .67

43 . Red Hill Av. at Deere Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	124	.07*	46	.03
NBT	3	5100	650	.13	2449	.48*
NBR	d	1700	78	.05	27	.02
SBL	1	1700	67	.04	21	.01*
SBT	3	5100	1500	.29*	797	.16
SBR	d	1700	122	.07	17	.01
EBL	1	1700	9	.01	106	.06
EBT	1	1700	35	.04*	81	.11*
EBR	0	0	36		114	
WBL	1	1700	24	.01*	63	.04*
WBT	1	1700	34	.02	67	.04
WBR	1	1700	41	.02	199	.12
Right Turn Adjustment					WBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .46 .71

44 . Red Hill Av. at Alton Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	123	.07*	37	.02
NBT	3	5100	737	.22	2111	.49*
NBR	0	0	379	.22	366	
SBL	1	1700	187	.11	139	.08*
SBT	3	5100	1415	.28*	842	.17
SBR	d	1700	70	.04	13	.01
EBL	1	1700	6	.00	33	.02
EBT	2	3400	44	.01*	192	.06*
EBR	1	1700	44	.03	116	.07
WBL	2	3400	441	.13*	558	.16*
WBT	1	1700	157	.09	115	.07
WBR	1	1700	67	.04	480	.28
Right Turn Adjustment					WBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .86

45 . Red Hill Av. at McGaw Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	466	.14*	138	.04
NBT	3	5100	1113	.22	2090	.41*
NBR	1	1700	274	.16	171	.10
SBL	2	3400	239	.07	73	.02*
SBT	3	5100	1566	.31*	1463	.29
SBR	d	1700	56	.03	65	.04
EBL	1	1700	13	.01	89	.05
EBT	2	3400	27	.02*	116	.07*
EBR	0	0	91	.05	335	.20
WBL	2	3400	273	.08*	293	.09*
WBT	2	3400	99	.05	57	.03
WBR	0	0	73		240	.14
Right Turn Adjustment					Multi	.03*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .67

47 . Red Hill Av. at MacArthur Blvd.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	90	.05*	382	.22*
NBT	3	5100	676	.14	958	.20
NBR	0	0	33		79	
SBL	2	3400	304	.09	494	.15
SBT	3	5100	1114	.22*	752	.15*
SBR	f		533		1074	
EBL	2	3400	957	.28*	834	.25*
EBT	3	5100	563	.11	386	.08
EBR	d	1700	180	.11	189	.11
WBL	1	1700	86	.05	99	.06
WBT	3	5100	587	.12*	874	.17*
WBR	f		607		747	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .84

48 . Red Hill Av. at Sky Park N

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	37	.02	30	.02
NBT	2	3400	688	.20*	1050	.31*
NBR	d	1700	60	.04	30	.02
SBL	1	1700	175	.10*	91	.05*
SBT	2	3400	956	.28	880	.26
SBR	d	1700	203	.12	66	.04
EBL	1	1700	19	.01*	101	.06*
EBT	1	1700	25	.01	39	.02
EBR	1	1700	16	.01	51	.03
WBL	1	1700	17	.01	89	.05
WBT	1	1700	30	.07*	94	.21*
WBR	0	0	93		259	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .43 .68

49 . Red Hill Av. at Main St.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	208	.06*	352	.10*
NBT	2	3400	680	.20	824	.24
NBR	1	1700	394	.23	286	.17
SBL	2	3400	126	.04	192	.06
SBT	2	3400	684	.24*	731	.31*
SBR	0	0	132		339	
EBL	2	3400	170	.05	219	.06
EBT	3	5100	1110	.29*	1101	.30*
EBR	0	0	353		422	
WBL	2	3400	293	.09*	457	.13*
WBT	3	5100	540	.13	1299	.28
WBR	0	0	109		127	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .73 .89

70 . Gillette Av. at Main St.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	66	.02*	275	.08*
NBT	1	1700	4	.00	23	.01
NBR	1	1700	30	.02	492	.29
SBL	2	3400	29	.01	245	.07
SBT	1	1700	20	.01*	15	.01*
SBR	d	1700	41	.02	249	.15
EBL	2	3400	297	.09*	90	.03*
EBT	4	6800	1001	.15	1423	.21
EBR	f		325		78	
WBL	2	3400	255	.08	67	.02
WBT	3	5100	1053	.25*	1073	.22*
WBR	0	0	218		28	
Right Turn Adjustment					Multi	.36*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .42 .75

71 . Armstrong St. at Barranca Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	41	.02*	214	.13
NBT	1	1700	33	.02	231	.14*
NBR	1	1700	46	.03	239	.14
SBL	1	1700	113	.07	119	.07*
SBT	1	1700	157	.09*	106	.06
SBR	1	1700	102	.06	107	.06
EBL	1	1700	81	.05	114	.07
EBT	3	5100	1093	.21*	1062	.21*
EBR	d	1700	164	.10	102	.06
WBL	1	1700	240	.14*	112	.07*
WBT	4	6800	1343	.22	1079	.18
WBR	0	0	130		125	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .51 .54

77 . MacArthur Bl. at Sky Park E.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	120	.07*	85	.05
NBT	3	5100	1143	.22	1626	.32*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6800	905	.15*	874	.14
SBR	0	0	142		65	
EBL	2	3400	36	.01*	170	.05*
EBT	0	0	0		0	
EBR	1	1700	64	.04	250	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .28 .42

78 . MacArthur Bl. at Main St.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	869	.26*	684	.20*
NBT	4	6800	884	.13	1156	.17
NBR	f		1286		480	
SBL	2	3400	387	.11	259	.08
SBT	4	6800	540	.08*	1010	.15*
SBR	1	1700	104	.06	100	.06
EBL	1	1700	82	.05	90	.05
EBT	3	5100	561	.11*	671	.13*
EBR	1	1700	296	.17	628	.37
WBL	2	3400	255	.08*	581	.17*
WBT	3	5100	569	.11	676	.13
WBR	f		205		583	
Right Turn Adjustment					EBR	.04*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .58 .74

79 . MacArthur Bl. at I-405 NB Ramps

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	2350	.35*	1964	.29*
NBR	2	3400	358	.11	993	.29
SBL	2	3400	222	.07*	570	.17*
SBT	4	6800	1009	.15	1623	.24
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	931	.27*	591	.17*
WBT	0	0	0		0	
WBR	2	3400	660	.19	279	.08
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .68

80 . MacArthur Bl. at I-405 SB Ramps

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1535	.23*	2300	.34*
NBR	1	1700	390	.23	678	.40
SBL	2	3400	174	.05*	582	.17*
SBT	4	6800	1234	.18	1314	.19
SBR	1	1700	505	.30	383	.23
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	984	.29*	656	.19*
WBT	1	1700	281	.17	287	.17
WBR	f		1136		640	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .75

82 . MacArthur Bl. at Michelson Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	209	.12*	120	.07
NBT	4	6800	1295	.19	1527	.22*
NBR	1	1700	234	.14	99	.06
SBL	2	3400	384	.11	785	.23*
SBT	4	6800	1856	.27*	1695	.25
SBR	0	0	0		0	
EBL	2	3400	284	.08*	442	.13
EBT	2	3400	152	.06	186	.08*
EBR	0	0	39		93	
WBL	2	3400	125	.04	472	.14*
WBT	1	1700	131	.08*	90	.05
WBR	1	1700	341	.20	821	.48
Right Turn Adjustment					WBR	.16*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION .60 .88

83 . MacArthur Bl. at Douglas Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1550	.23*	1476	.22
NBR	0	0	37		31	
SBL	2	3400	273	.08*	150	.04
SBT	4	6800	1569	.23	2033	.30*
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	21	.01*	23	.01*
WBT	0	0	0		0	
WBR	1	1700	120	.07	166	.10
Right Turn Adjustment					WBR	.03*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .37 .39

87 . Dupont Dr. at Michelson Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	134	.08*	261	.15*
NBT	2	3400	71	.03	77	.05
NBR	0	0	39		93	.05
SBL	1	1700	14	.01	112	.07
SBT	2	3400	10	.01*	63	.04*
SBR	0	0	17	.01	115	.07
EBL	1	1700	80	.05	78	.05*
EBT	2	3400	577	.25*	496	.17
EBR	0	0	270		78	
WBL	1	1700	30	.02*	39	.02
WBT	3	5100	459	.12	934	.20*
WBR	0	0	139		95	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .41 .49

97 . Von Karman Av. at Barranca Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	167	.05*	469	.14*
NBT	2	3400	97	.03	204	.06
NBR	d	1700	175	.10	734	.43
SBL	2	3400	97	.03	127	.04
SBT	2	3400	469	.14*	197	.06*
SBR	2	3400	94	.03	81	.02
EBL	1	1700	41	.02	35	.02
EBT	3	5100	617	.12*	1150	.23*
EBR	d	1700	334	.20	201	.12
WBL	2	3400	694	.20*	221	.07*
WBT	4	6800	1234	.18	791	.12
WBR	1	1700	71	.04	40	.02
Right Turn Adjustment			EBR	.04*	NBR	.22*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .77

98 . Von Karman Av. at Alton Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	72	.04*	166	.10
NBT	2	3400	410	.12	1068	.31*
NBR	d	1700	80	.05	460	.27
SBL	1	1700	62	.04	228	.13*
SBT	2	3400	1091	.32*	386	.11
SBR	d	1700	44	.03	78	.05
EBL	1	1700	29	.02*	52	.03
EBT	2	3400	238	.07	912	.27*
EBR	d	1700	44	.03	99	.06
WBL	1	1700	355	.21	115	.07*
WBT	2	3400	1003	.29*	516	.15
WBR	d	1700	181	.11	100	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .83

99 . Von Karman Av. at McGaw Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	63	.04*	31	.02
NBT	2	3400	424	.12	1935	.57*
NBR	d	1700	37	.02	131	.08
SBL	1	1700	53	.03	38	.02*
SBT	2	3400	1377	.41*	515	.15
SBR	d	1700	56	.03	20	.01
EBL	1	1700	12	.01*	74	.04
EBT	2	3400	111	.04	421	.15*
EBR	0	0	38		75	
WBL	1	1700	145	.09	40	.02*
WBT	2	3400	381	.13*	170	.08
WBR	0	0	44		111	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .64 .81

100 . Von Karman Av. at Main St.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	133	.04*	324	.10
NBT	2	3400	380	.11	1078	.32*
NBR	1	1700	87	.05	258	.15
SBL	1	1700	89	.05	147	.09*
SBT	2	3400	1149	.34*	604	.18
SBR	1	1700	291	.17	190	.11
EBL	2	3400	295	.09*	566	.17
EBT	3	5100	524	.10 .	1576	.31*
EBR	f		291		178	
WBL	2	3400	330	.10	118	.03*
WBT	3	5100	1086	.24*	677	.15
WBR	0	0	115		96	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .80

101 . Von Karman Av. at Morse Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	249	.07*	79	.02
NBT	2	3400	572	.20	1386	.41*
NBR	0	0	110		14	
SBL	1	1700	143	.08	34	.02*
SBT	2	3400	1175	.35*	807	.24
SBR	f		141		30	
EBL	1	1700	12	.01*	54	.03*
EBT	1	1700	8	.00	2	.00
EBR	f		50		244	
WBL	1	1700	10	.01	89	.05
WBT	1	1700	2	.02*	11	.10*
WBR	0	0	38		160	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .50 .61

102 . Von Karman Av. at Michelson Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	58	.03	68	.04*
NBT	2	3400	885	.26*	971	.29
NBR	1	1700	77	.05	106	.06
SBL	1	1700	162	.10*	269	.16
SBT	2	3400	677	.24	1335	.45*
SBR	0	0	141		193	
EBL	1	1700	165	.10*	204	.12*
EBT	2	3400	191	.07	525	.18
EBR	0	0	44		95	
WBL	1	1700	209	.12	181	.11
WBT	2	3400	541	.16*	689	.20*
WBR	f		420		355	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .86

103 . Von Karman Av. at Dupont Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	96	.06	60	.04*
NBT	2	3400	976	.30*	1001	.32
NBR	0	0	34		88	
SBL	1	1700	71	.04*	83	.05
SBT	2	3400	720	.21	1272	.37*
SBR	1	1700	43	.03	36	.02
EBL	1	1700	5	.00	19	.01
EBT	2	3400	75	.04*	159	.09*
EBR	0	0	59		142	
WBL	1	1700	94	.06*	66	.04*
WBT	2	3400	172	.08	214	.10
WBR	0	0	94		140	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .49 .59

104 . Von Karman Av. at Martin

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	31	.02	20	.01*
NBT	2	3400	957	.28*	963	.28
NBR	1	1700	16	.01	30	.02
SBL	1	1700	22	.01*	27	.02
SBT	2	3400	686	.25	1318	.42*
SBR	0	0	158		120	
EBL	2	3400	87	.03*	168	.05*
EBT	1	1700	2	.02	3	.03
EBR	0	0	31		50	
WBL	1	1700	3	.00	28	.02
WBT	1	1700	2	.00*	10	.04*
WBR	0	0	6		52	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .37 .57

112 . Myford Rd. at Michelle Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	40	.01*	29	.01*
NBT	0	0	0		0	
NBR	1	1700	80	.05	261	.15
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	90	.03*	452	.13*
EBR	d	1700	11	.01	18	.01
WBL	1	1700	129	.08*	55	.03*
WBT	2	3400	240	.07	116	.03
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.12*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .17 .34

113 . Myford Rd. at Walnut Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	7	.00	107	.06
NBT	1	1700	6	.00*	85	.05*
NBR	f		68		339	
SBL	2	3400	63	.02*	167	.05*
SBT	1	1700	17	.01	12	.01
SBR	1	1700	114	.07	130	.08
EBL	1	1700	76	.04	43	.03*
EBT	2	3400	799	.24*	768	.23
EBR	d	1700	40	.02	9	.01
WBL	2	3400	323	.10*	38	.01
WBT	2	3400	789	.23	986	.29*
WBR	1	1700	198	.12	84	.05
Right Turn Adjustment					SBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .41 .49

114 . Millikan Av. at Barranca Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	117	.07*	52	.03
NBT	2	3400	54	.02	41	.01*
NBR	d	1700	90	.05	391	.23
SBL	2	3400	69	.02	324	.10*
SBT	0.5	3400	44	.03*	70	.04
SBR	1.5		47	{.02}	51	
EBL	2	3400	42	.01*	61	.02
EBT	3	5100	530	.10	1616	.32*
EBR	d	1700	164	.10	80	.05
WBL	1	1700	168	.10	58	.03*
WBT	4	6800	1549	.23*	729	.11
WBR	1	1700	196	.12	657	.39
Right Turn Adjustment					NBR	.20*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .39 .71

115 . Millikan Av. at Alton Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	8	.00	20	.01
NBT	1	1700	6	.00*	20	.01*
NBR	1	1700	16	.01	40	.02
SBL	1	1700	52	.03*	89	.05*
SBT	1	1700	13	.01	8	.00
SBR	1	1700	116	.07	153	.09
EBL	1	1700	85	.05*	204	.12
EBT	2	3400	292	.09	1011	.30*
EBR	d	1700	15	.01	15	.01
WBL	1	1700	73	.04	18	.01*
WBT	2	3400	957	.28*	497	.15
WBR	d	1700	149	.09	75	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .41 .42

116 . Cartwright Rd. at Main St.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	25	.01*	83	.05*
NBT	1	1700	1	.00	2	.00
NBR	1	1700	24	.01	235	.14
SBL	2	3400	5	.00	90	.03
SBT	1	1700	2	.01*	3	.04*
SBR	0	0	13		57	
EBL	1	1700	45	.03*	20	.01
EBT	3	5100	491	.11	1914	.38*
EBR	0	0	80		27	
WBL	2	3400	208	.06	40	.01*
WBT	3	5100	1542	.32*	1050	.21
WBR	0	0	74		8	
Right Turn Adjustment					NBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.42		.60

119 . Teller Av. at Michelson Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	90	.03	197	.06
NBT	1	1700	16	.02*	0	.28*
NBR	0	0	24		483	
SBL	1	1700	234	.14*	183	.11*
SBT	1	1700	182	.11	59	.03
SBR	1	1700	365	.21	148	.09
EBL	1	1700	27	.02	180	.11*
EBT	3	5100	214	.04*	974	.19
EBR	1	1700	169	.10	193	.11
WBL	1	1700	492	.29*	28	.02
WBT	3	5100	1471	.29	615	.12*
WBR	1	1700	77	.05	60	.04
Right Turn Adjustment			Multi	.07*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.61		.67

126 . Jamboree Rd. at Bryan Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	110	.03*	254	.07
NBT	4	6800	632	.09	1973	.29*
NBR	1	1700	129	.08	406	.24
SBL	2	3400	263	.08	68	.02*
SBT	4	6800	2308	.34*	826	.12
SBR	d	1700	128	.08	164	.10
EBL	2	3400	57	.02	230	.07
EBT	2	3400	298	.09*	522	.15*
EBR	d	1700	181	.11	119	.07
WBL	2	3400	511	.15*	312	.09*
WBT	2	3400	523	.15	508	.15
WBR	1	1700	251	.15	210	.12
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.66		.60

127 . Jamboree Rd. at El Camino Real

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	263	.08*	460	.14
NBT	4	6800	714	.11	1705	.25*
NBR	1	1700	537	.32	285	.17
SBL	1	1700	179	.11	100	.06*
SBT	4	6800	2530	.37*	855	.13
SBR	1	1700	138	.08	174	.10
EBL	1	1700	74	.04	207	.12
EBT	1	1700	145	.09*	177	.10*
EBR	2	3400	216	.06	317	.09
WBL	2	3400	343	.10*	676	.20*
WBT	2	3400	69	.04	239	.13
WBR	0	0	52		186	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.69		.66

128 . Jamboree Rd. at I-5 NB Ramps

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1204	.18	2576	.38*
NBR	f		690		690	
SBL	0	0	0		0	
SBT	4	6800	1785	.26*	1513	.22
SBR	f		484		480	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		984	.29*	357	.21*
WBT	0	5100	0		0	
WBR	1.5		504	{.24}	974	.29
Right Turn Adjustment					WBR	.08*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .72

129 . Jamboree Rd. at I-5 SB Ramps

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1427	.21	2490	.37*
NBR	f		450		1120	
SBL	0	0	0		0	
SBT	4	6800	2012	.30*	1458	.21
SBR	f		540		430	
EBL	2	3400	453	.13*	730	.21*
EBT	0	0	0		0	
EBR	2	3400	1008	.30	772	.23
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.17*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .63

130 . Jamboree Rd. at Michelle Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	320	.19*	261	.15*
NBT	4	6800	1339	.20	2756	.41
NBR	d	1700	0	.00	0	.00
SBL	1	1700	0	.00	0	.00
SBT	4	6800	3134	.46*	1870	.28*
SBR	d	1700	740	.44	411	.24
EBL	2	3400	201	.06*	803	.24*
EBT	0.5	3400	0	.00	20	{.05}
EBR	1.5		206		339	
WBL	1	1700	0	.00	2	.00
WBT	1	1700	0	.00*	4	.00*
WBR	0	0	1		4	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .72

131 . Jamboree Rd. SB at Walnut Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	315	.09	330	.10
SBT	2	3400	613	.18*	571	.17*
SBR	1	1700	231	.14	153	.09
EBL	0	0	0		0	
EBT	3	5100	385	.08*	650	.13*
EBR	1	1700	210	.12	345	.20
WBL	2	3400	407	.12*	244	.07*
WBT	3	5100	549	.11	737	.14
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.04*	EBR	.07*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .47 .49

132 . Jamboree Rd. NB at Walnut Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	311	.09	557	.16*
NBT	2	3400	361	.11*	483	.14
NBR	d	1700	207	.12	519	.31
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3400	39	.01*	169	.05*
EBT	3	5100	653	.13	882	.17
EBR	0	0	0		0	
WBL	0	0	4		0	
WBT	3	5100	939	.18*	833	.16*
WBR	1	1700	420	.25	426	.25
Right Turn Adjustment			WBR	.07*	Multi	.19*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.42		.61

133 . Jamboree Rd. at Edinger Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	96	.03	180	.05
NBT	0	0	0		0	
NBR	1	1700	85	.05	350	.21
SBL	2	3400	230	.07*	454	.13*
SBT	0	0	0		0	
SBR	f		810		326	
EBL	2	3400	236	.07*	485	.14*
EBT	3	5100	521	.10	916	.20
EBR	0	0	13		79	
WBL	2	3400	221	.07	131	.04
WBT	3	5100	1142	.22*	764	.15*
WBR	1	1700	446	.26	215	.13
Right Turn Adjustment					NBR	.14*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.41		.61

134 . Loop Rd. at Warner Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	29	.02	66	.04
NBT	1	1700	10	.01*	192	.11*
NBR	1	1700	110	.06	469	.28
SBL	1	1700	143	.08*	198	.12*
SBT	2	3400	153	.05	323	.10
SBR	1	1700	927	.55	238	.14
EBL	1	1700	31	.02*	33	.02
EBT	2	3400	565	.17	1800	.53*
EBR	1	1700	68	.04	30	.02
WBL	2	3400	143	.04	295	.09*
WBT	2	3400	701	.21*	437	.13
WBR	1	1700	9	.01	22	.01
Right Turn Adjustment			SBR	.46*	NBR	.10*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.83		1.00

136 . Jamboree Rd. at Barranca Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	174	.05*	249	.07
NBT	4	6800	993	.15	2929	.43*
NBR	f		113		239	
SBL	2	3400	332	.10	356	.10*
SBT	4	6800	2966	.44*	1542	.23
SBR	f		990		344	
EBL	2.5		187	.06	1086	
EBT	2.5	8500	541	.11*	776	.22*
EBR	1	1700	102	.06	128	.08
WBL	2	3400	264	.08	252	.07
WBT	3	5100	808	.16*	818	.16*
WBR	f		208		460	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing

TOTAL CAPACITY UTILIZATION .81 .96

137 . Jamboree Rd. at Beckman Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	38	.02*	8	.00
NBT	4	6800	1204	.19	3241	.48*
NBR	0	0	108		39	
SBL	1	1700	54	.03	47	.03*
SBT	4	6800	3178	.49*	1852	.28
SBR	0	0	177		32	
EBL	1	1700	49	.03*	206	.12*
EBT	1	1700	8	.00	24	.01
EBR	d	1700	4	.00	10	.01
WBL	1	1700	88	.05	51	.03
WBT	1	1700	35	.05*	10	.03*
WBR	0	0	48		49	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .64 .71

138 . Jamboree Rd. at Alton Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	288	.08*	207	.06
NBT	4	6800	1022	.15	2817	.41*
NBR	1	1700	173	.10	227	.13
SBL	2	3400	196	.06	206	.06*
SBT	4	6800	2843	.46*	1706	.27
SBR	0	0	265		145	
EBL	2	3400	60	.02*	188	.06
EBT	3	5100	230	.06	1137	.26*
EBR	0	0	71		166	
WBL	2	3400	187	.06	268	.08*
WBT	3	5100	867	.17*	458	.09
WBR	d	1700	158	.09	184	.11
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .78 .86

139 . Jamboree Rd. at McGaw Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	226	.07*	82	.02
NBT	4	6800	1421	.21	3010	.45*
NBR	0	0	35		77	
SBL	2	3400	19	.01	28	.01*
SBT	4	6800	2744	.44*	1929	.29
SBR	0	0	244		53	
EBL	1	1700	27	.02*	236	.14*
EBT	2	3400	26	.02	195	.11
EBR	0	0	27	.02	169	
WBL	1	1700	48	.03	42	.02
WBT	2	3400	119	.04*	45	.02*
WBR	0	0	22		34	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .67

140 . Jamboree Rd. at Kelvin Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	144	.08*	112	.07
NBT	4	6800	1565	.25	3146	.51*
NBR	0	0	114		290	
SBL	1	1700	8	.00	14	.01*
SBT	4	6800	3158	.46*	2381	.35
SBR	d	1700	20	.01	25	.01
EBL	1	1700	29	.02	26	.02
EBT	1	1700	8	.00*	15	.01*
EBR	d	1700	93	.05	129	.08
WBL	1	1700	158	.09*	119	.07*
WBT	1	1700	16	.02	13	.01
WBR	0	0	16		8	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .65

141 . Jamboree Rd. at Main St.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	668	.20*	552	.16*
NBT	4	6800	1593	.23	2654	.39
NBR	f		200		495	
SBL	2	3400	435	.13	311	.09
SBT	4	6800	2496	.37*	2261	.33*
SBR	1	1700	608	.36	186	.11
EBL	2	3400	124	.04	453	.13
EBT	3	5100	265	.05*	1173	.23*
EBR	f		251		753	
WBL	2	3400	692	.20*	586	.17*
WBT	3	5100	714	.14	352	.07
WBR	f		94		292	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .87 .94

143 . Jamboree Rd. at I-405 NB Ramps

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1739	.34*	3487	.68*
NBR	f		600		970	
SBL	0	0	0		0	
SBT	4	6800	1819	.27	2499	.37
SBR	f		1750		1140	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	3	5100	1481	.29*	721	.14*
WBT	0	0	0		0	
WBR	f		921		233	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .87

144 . Jamboree Rd. at I-405 SB Ramps

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1637	.24	2880	.42*
NBR	f		620		1060	
SBL	0	0	0		0	
SBT	4	6800	2994	.44*	2778	.41
SBR	f		270		640	
EBL	1.5		703	{.35}*	1520	.45*
EBT	0	6800	0	.35	0	
EBR	2.5		1656		1092	.32
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .84 .92

145 . Jamboree Rd. at Michelson Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	154	.09*	66	.04
NBT	4	6800	1405	.21	2372	.35*
NBR	1	1700	180	.11	561	.33
SBL	2	3400	609	.18	1114	.33*
SBT	4	6800	2677	.39*	2006	.29
SBR	f		526		421	
EBL	2	3400	252	.07*	1055	.31*
EBT	2	3400	202	.06	384	.11
EBR	1	1700	76	.04	171	.10
WBL	2	3400	407	.12	314	.09
WBT	2	3400	510	.15*	263	.08*
WBR	f		613		704	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.75		1.12

146 . Jamboree Rd. at Dupont Rd.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	245	.14*	88	.05
NBT	4	6800	1459	.21	2357	.35*
NBR	1	1700	11	.01	29	.02
SBL	1	1700	46	.03	182	.11*
SBT	3	5100	2177	.43*	2042	.40
SBR	d	1700	493	.29	203	.12
EBL	2	3400	70	.02*	360	.11
EBT	1	1700	13	.04	59	.19*
EBR	0	0	47		270	
WBL	1	1700	36	.02	28	.02*
WBT	2	3400	62	.04*	19	.01
WBR	0	0	131	.08	52	.03
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.68		.72

164 . Construction S. at Barranca Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	32	.02*	338	.20*
NBT	1	1700	8	.01	12	.16
NBR	0	0	10		259	
SBL	1	1700	25	.01	22	.01
SBT	1	1700	47	.03*	17	.01*
SBR	1	1700	109	.06	71	.04
EBL	1	1700	118	.07	94	.06*
EBT	3	5100	815	.16*	1276	.25
EBR	1	1700	111	.07	23	.01
WBL	1	1700	242	.14*	80	.05
WBT	3	5100	949	.19	1381	.27*
WBR	d	1700	24	.01	25	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.40		.59

168 . Murphy Av. at Alton Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	28	.02*	68	.04
NBT	1	1700	20	.05	138	.28*
NBR	0	0	72		334	
SBL	1	1700	39	.02	104	.06*
SBT	1	1700	45	.05*	45	.10
SBR	0	0	45		120	
EBL	1	1700	103	.06*	59	.03
EBT	3	5100	440	.09	1422	.28*
EBR	d	1700	42	.02	33	.02
WBL	1	1700	134	.08	82	.05*
WBT	3	5100	1212	.24*	711	.14
WBR	d	1700	118	.07	23	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.42		.72

170 . Union at Main St.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	126	.04*	580	.17*
NBT	1	1700	3	.01	8	.05
NBR	0	0	11		80	
SBL	1	1700	14	.01	36	.02
SBT	1	1700	2	.00*	1	.00*
SBR	1	1700	34	.02	33	.02
EBL	2	3400	91	.03*	103	.03
EBT	3	5100	515	.10	1849	.36*
EBR	f		276		92	
WBL	2	3400	62	.02	37	.01*
WBT	3	5100	1410	.28*	621	.13
WBR	0	0	7		29	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .40 .59

171 . Veneto at Main St.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	238	.07*	159	.05
NBT	1	1700	6	.02	22	.11*
NBR	0	0	25		170	
SBL	1	1700	45	.03	29	.02*
SBT	1	1700	11	.05*	7	.02
SBR	0	0	74		24	
EBL	1	1700	25	.01*	101	.06
EBT	3	5100	322	.07	1688	.35*
EBR	0	0	54		90	
WBL	2	3400	75	.02	43	.01*
WBT	3	5100	1054	.21*	420	.09
WBR	0	0	19		37	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .39 .54

174 . Carlson Av. at Michelson Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	476	.14*	103	.03*
NBT	2	3400	121	.04	80	.02
NBR	1	1700	145	.09	338	.20
SBL	2	3400	25	.01	122	.04
SBT	1	1700	26	.02*	134	.08*
SBR	f		220		455	
EBL	2	3400	428	.13*	527	.16
EBT	2	3400	510	.15	1121	.33*
EBR	1	1700	74	.04	421	.25
WBL	1	1700	200	.12	265	.16*
WBT	2	3400	884	.26*	713	.21
WBR	f		81		134	
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .66

175 . Carlson Av. at Campus Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	148	.09*	172	.10*
SBT	0	0	2		0	
SBR	1	1700	332	.20	159	.09
EBL	1	1700	105	.06*	304	.18
EBT	1	1700	492	.29	1083	.64*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1700	838	.49*	645	.38
WBR	d	1700	85	.05	117	.07
Right Turn Adjustment			SBR	.06*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .75 .79

180 . Harvard Av. at Walnut Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	257	.08*	291	.09*
NBT	1	1700	64	.04	67	.04
NBR	d	1700	112	.07	202	.12
SBL	1	1700	186	.11	130	.08
SBT	1	1700	114	.07*	49	.03*
SBR	1	1700	164	.10	62	.04
EBL	1	1700	31	.02*	131	.08
EBT	2	3400	332	.10	829	.24*
EBR	1	1700	191	.11	290	.17
WBL	1	1700	116	.07	151	.09*
WBT	2	3400	1059	.31*	637	.19
WBR	d	1700	125	.07	42	.02
Right Turn Adjustment			SBR	.01*	NBR	.01*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .51

181 . Harvard Av. at Edinger Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	230	.07*	225	.07
NBT	2	3400	176	.05	423	.12*
NBR	1	1700	106	.06	246	.14
SBL	1	1700	195	.11	90	.05*
SBT	2	3400	357	.11*	181	.05
SBR	d	1700	125	.07	60	.04
EBL	2	3400	57	.02*	168	.05*
EBT	3	5100	639	.13	1194	.23
EBR	1	1700	156	.09	126	.07
WBL	2	3400	298	.09	93	.03
WBT	3	5100	1415	.30*	1055	.23*
WBR	0	0	98		119	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .50

182 . Harvard Av. at Paseo Westpark

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	89	.05*	0	.00
NBT	2	3400	259	.08	833	.25*
NBR	d	1700	28	.02	109	.06
SBL	1	1700	29	.02	36	.02*
SBT	2	3400	746	.22*	383	.11
SBR	1	1700	111	.07	58	.03
EBL	1	1700	38	.02	51	.03
EBT	1	1700	43	.03*	98	.06*
EBR	d	1700	0	.00	0	.00
WBL	1	1700	174	.10*	52	.03*
WBT	1	1700	0	.00	43	.03
WBR	d	1700	213	.13	97	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .41

183 . Harvard Av. at Warner Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	217	.13
NBT	2	3400	205	.06	890	.26*
NBR	d	1700	65	.04	152	.09
SBL	1	1700	106	.06	69	.04*
SBT	2	3400	782	.23*	363	.11
SBR	d	1700	122	.07	59	.03
EBL	1	1700	122	.07*	190	.11*
EBT	2	3400	311	.09	609	.18
EBR	d	1700	136	.08	111	.07
WBL	1	1700	134	.08	66	.04
WBT	2	3400	610	.18*	394	.12*
WBR	d	1700	84	.05	79	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .58

184 . Harvard Av. at Barranca Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	179	.11*	318	.19
NBT	2	3400	316	.09	1003	.29*
NBR	1	1700	76	.04	124	.07
SBL	1	1700	139	.08	80	.05*
SBT	2	3400	721	.21*	383	.11
SBR	1	1700	189	.11	57	.03
EBL	2	3400	40	.01*	142	.04
EBT	3	5100	395	.08	986	.19*
EBR	1	1700	154	.09	253	.15
WBL	2	3400	194	.06	124	.04*
WBT	3	5100	1022	.21*	795	.18
WBR	0	0	64		115	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .62

185 . Harvard Av. at Alton Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	302	.18*	149	.09
NBT	2	3400	401	.12	1206	.35*
NBR	d	1700	76	.04	183	.11
SBL	1	1700	30	.02	94	.06*
SBT	2	3400	868	.26*	518	.15
SBR	1	1700	262	.15	108	.06
EBL	2	3400	98	.03*	310	.09
EBT	3	5100	245	.05	1114	.22*
EBR	1	1700	146	.09	265	.16
WBL	2	3400	209	.06	159	.05*
WBT	3	5100	981	.20*	465	.10
WBR	0	0	41		57	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .73

186 . Harvard Av. at Main St.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	136	.04*	141	.04
NBT	2	3400	374	.11	1122	.33*
NBR	1	1700	80	.05	306	.18
SBL	2	3400	51	.02	31	.01*
SBT	2	3400	956	.28*	684	.20
SBR	1	1700	483	.28	156	.09
EBL	2	3400	147	.04*	717	.21
EBT	3	5100	209	.06	1343	.32*
EBR	0	0	104		299	
WBL	2	3400	370	.11	127	.04*
WBT	3	5100	731	.15*	203	.04
WBR	0	0	29		21	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .56 .75

187 . Harvard Av. at Coronado

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	187	.06*	190	.06
NBT	2	3400	486	.15	1366	.41*
NBR	0	0	9		36	
SBL	1	1700	30	.02	70	.04*
SBT	2	3400	1214	.36*	907	.27
SBR	d	1700	173	.10	70	.04
EBL	2	3400	46	.01*	104	.03
EBT	1	1700	1	.00	64	.04*
EBR	d	1700	143	.08	251	.15
WBL	1	1700	32	.02	15	.01*
WBT	1	1700	9	.01*	10	.01
WBR	1	1700	89	.05	54	.03
Right Turn Adjustment			EBR	.03*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .55

188 . Harvard Av. at Michelson Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	76	.04
NBT	2	3400	306	.10	920	.30*
NBR	0	0	27		104	
SBL	1	1700	158	.09	351	.21*
SBT	2	3400	748	.22*	573	.17
SBR	1	1700	452	.27	266	.16
EBL	2	3400	135	.04*	424	.12
EBT	2	3400	254	.07	935	.28*
EBR	f		54		121	
WBL	1	1700	138	.08	86	.05*
WBT	2	3400	749	.28*	388	.17
WBR	0	0	190		186	
Right Turn Adjustment			SBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .89

189 . Harvard Av. at University Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	76	.04*	69	.04
NBT	2	3400	256	.08	549	.16*
NBR	d	1700	48	.03	202	.12
SBL	1	1700	16	.01	79	.05*
SBT	2	3400	463	.14*	465	.14
SBR	d	1700	410	.24	275	.16
EBL	1	1700	138	.08*	526	.31*
EBT	3	5100	556	.12	1689	.34
EBR	0	0	48		65	
WBL	1	1700	121	.07	110	.06
WBT	3	5100	1769	.36*	795	.16*
WBR	0	0	77		35	
Right Turn Adjustment			SBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .71 .73

190 . University Dr. at Campus Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	88	.05*	187	.11*
NBT	3	5100	552	.11	1466	.29
NBR	1	1700	315	.19	358	.21
SBL	1	1700	94	.06	80	.05
SBT	2	3400	1683	.50*	889	.26*
SBR	1	1700	180	.11	80	.05
EBL	1	1700	191	.11*	369	.22*
EBT	2	3400	370	.11	594	.17
EBR	d	1700	17	.01	107	.06
WBL	1	1700	40	.02	226	.13
WBT	2	3400	422	.12*	544	.16*
WBR	d	1700	247	.15	110	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .83 .80

191 . Mesa Rd. at University Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01*	152	.09*
NBT	0	0	0		0	
NBR	1	1700	50	.03	199	.12
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	940	.28	1951	.57*
EBR	1	1700	102	.06	55	.03
WBL	1	1700	168	.10	125	.07*
WBT	2	3400	1720	.51*	1038	.31
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .78

192 . California Av. at University Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	48	.01*	224	.07*
NBT	0	0	0		0	
NBR	1	1700	102	.06	777	.46
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	1008	.30*	1175	.35*
EBR	1	1700	311	.18	59	.03
WBL	2	3400	719	.21*	92	.03*
WBT	2	3400	1052	.31	1124	.33
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.37*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .87

193 . MacArthur Blvd. NB at University Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	54	.03*	28	.02*
NBT	0	0	0		0	
NBR	1	1700	246	.14	312	.18
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1074	.21*	878	.17*
EBR	d	1700	109	.06	93	.05
WBL	2	3400	331	.10*	617	.18*
WBT	2	3400	796	.23	742	.22
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.03*	NBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .42 .44

196 . Hearthstone Bl. at ICD

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02*	24	.01
NBT	2	3400	48	.01	51	.02*
NBR	d	1700	326	.19	228	.13
SBL	1	1700	37	.02	27	.02*
SBT	1	1700	43	.03*	38	.02
SBR	d	1700	30	.02	25	.01
EBL	1	1700	28	.02*	93	.05
EBT	3	5100	881	.19	1456	.30*
EBR	0	0	71		76	
WBL	1	1700	197	.12	316	.19*
WBT	3	5100	1596	.32*	1411	.28
WBR	0	0	15		36	
Right Turn Adjustment			NBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .49 .58

198 . Paseo Westpark at Warner Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	155	.09*	123	.07
NBT	1	1700	113	.07	272	.16*
NBR	d	1700	42	.02	46	.03
SBL	1	1700	49	.03	53	.03*
SBT	1	1700	298	.18*	116	.07
SBR	d	1700	74	.04	51	.03
EBL	1	1700	137	.08*	117	.07
EBT	2	3400	349	.10	525	.15*
EBR	d	1700	83	.05	158	.09
WBL	1	1700	69	.04	48	.03*
WBT	2	3400	541	.16*	359	.11
WBR	d	1700	110	.06	64	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .56 .42

199 . Paseo Westpark at Barranca Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	104	.03*	165	.05
NBT	1	1700	107	.06	307	.18*
NBR	1	1700	149	.09	200	.12
SBL	2	3400	111	.03	83	.02*
SBT	1	1700	270	.16*	159	.09
SBR	d	1700	101	.06	69	.04
EBL	1	1700	28	.02*	96	.06
EBT	3	5100	540	.11	1068	.21*
EBR	1	1700	84	.05	159	.09
WBL	1	1700	166	.10	131	.08*
WBT	3	5100	1265	.26*	876	.20
WBR	0	0	44		127	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .54

200 . Paseo Westpark at Alton Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	88	.05	78	.05
NBT	1	1700	148	.15*	288	.22*
NBR	0	0	104		93	
SBL	1	1700	181	.11*	86	.05*
SBT	1	1700	149	.09	127	.07
SBR	1	1700	230	.14	126	.07
EBL	1	1700	25	.01*	87	.05
EBT	3	5100	435	.11	795	.17*
EBR	0	0	101		59	
WBL	1	1700	131	.08	125	.07*
WBT	3	5100	1131	.22*	608	.12
WBR	d	1700	138	.08	157	.09
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .56

201 . Paseo Westpark at Main St.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	194	.11	43	.03
NBT	1	1700	186	.19*	281	.20*
NBR	0	0	141		58	
SBL	1	1700	149	.09*	47	.03*
SBT	1	1700	223	.13	126	.07
SBR	1	1700	139	.08	69	.04
EBL	1	1700	15	.01*	54	.03
EBT	2	3400	343	.10	716	.21*
EBR	d	1700	142	.08	114	.07
WBL	1	1700	87	.05	30	.02*
WBT	2	3400	954	.28*	268	.08
WBR	d	1700	120	.07	64	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .51

221 . Culver Dr. at Bryan Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	370	.11*	654	.19*
NBT	3	5100	720	.14	1553	.30
NBR	1	1700	220	.13	544	.32
SBL	2	3400	113	.03	131	.04
SBT	3	5100	2105	.41*	859	.17*
SBR	d	1700	292	.17	119	.07
EBL	2	3400	96	.03*	205	.06*
EBT	1.5	5100	158	{.08}	395	{.12}
EBR	1.5		366		429	{.11}
WBL	2	3400	549	.16	261	.08
WBT	2	3400	588	.22*	517	.19*
WBR	0	0	174		142	
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .82 .66

222 . Culver Dr. at Trabuco Rd.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	664	.13*	1914	.38*
NBR	f		1162		1369	
SBL	1	1700	576	.34*	296	.17*
SBT	3	5100	2338	.46	1213	.24
SBR	f		718		180	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	637	.19*	483	.14*
WBT	0	0	0		0	
WBR	2	3400	713	.21	795	.23
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .71 .74

223 . Culver Dr. at I-5 SB Ramps

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1178	.23	1833	.36*
NBR	f		240		300	
SBL	0	0	0		0	
SBT	3	5100	2013	.39*	1386	.27
SBR	f		391		260	
EBL	3	5100	755	.15*	1157	.23*
EBT	0	0	0		0	
EBR	2	3400	462	.14	894	.26
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .64

224 . Culver Dr. at Walnut Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	162	.05*	306	.09
NBT	3	5100	767	.15	1479	.29*
NBR	1	1700	252	.15	335	.20
SBL	2	3400	245	.07	381	.11*
SBT	3	5100	1823	.36*	1369	.27
SBR	1	1700	471	.28	260	.15
EBL	2	3400	317	.09*	573	.17*
EBT	2	3400	473	.14	533	.16
EBR	1	1700	190	.11	133	.08
WBL	2	3400	417	.12	348	.10
WBT	2	3400	737	.22*	604	.18*
WBR	1	1700	296	.17	228	.13
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .77 .80

225 . Culver Dr. at Deerfield Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	22	.01*	86	.03
NBT	3	5100	909	.18	1719	.34*
NBR	1	1700	95	.06	141	.08
SBL	2	3400	158	.05	142	.04*
SBT	3	5100	2073	.41*	1510	.30
SBR	1	1700	143	.08	213	.13
EBL	1	1700	170	.10*	330	.19*
EBT	1	1700	157	.09	138	.08
EBR	d	1700	102	.06	142	.08
WBL	1	1700	195	.11	78	.05
WBT	1	1700	115	.19*	61	.10*
WBR	0	0	211		102	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .72

226 . Culver Dr. at ICD

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	284	.08*	274	.08
NBT	4	6800	656	.10	1414	.21*
NBR	f		160		386	
SBL	2	3400	177	.05	315	.09*
SBT	4	6800	1814	.27*	1279	.19
SBR	1	1700	309	.18	178	.10
EBL	2	3400	194	.06*	274	.08*
EBT	3	5100	734	.14	1079	.21
EBR	f		212		159	
WBL	2	3400	383	.11	242	.07
WBT	3	5100	1187	.23*	1038	.20*
WBR	f		110		202	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .63

227 . Culver Dr. at Warner Av.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	120	.07*	205	.12
NBT	3	5100	961	.19	1791	.35*
NBR	1	1700	66	.04	182	.11
SBL	1	1700	84	.05	99	.06*
SBT	3	5100	2195	.43*	1349	.26
SBR	d	1700	179	.11	224	.13
EBL	2	3400	219	.06	218	.06
EBT	2	3400	210	.06*	230	.07*
EBR	d	1700	202	.12	182	.11
WBL	1	1700	213	.13*	99	.06*
WBT	2	3400	350	.10	141	.04
WBR	d	1700	149	.09	121	.07
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .75 .59

228 . Culver Dr. at Barranca Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	116	.03*	238	.07
NBT	3	5100	640	.13	1566	.31*
NBR	1	1700	314	.18	356	.21
SBL	2	3400	363	.11	279	.08*
SBT	3	5100	1944	.38*	1127	.22
SBR	f		294		194	
EBL	2	3400	416	.12*	314	.09*
EBT	2	3400	813	.24	675	.20
EBR	1	1700	171	.10	431	.25
WBL	2	3400	365	.11	252	.07
WBT	2	3400	821	.24*	648	.19*
WBR	d	1700	155	.09	311	.18
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .82 .72

229 . Culver Dr. at Alton Pkwy.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	122	.04*	246	.07
NBT	3	5100	858	.17	1884	.37*
NBR	1	1700	244	.14	340	.20
SBL	2	3400	133	.04	192	.06*
SBT	3	5100	1935	.38*	1067	.21
SBR	f		264		201	
EBL	2	3400	104	.03*	266	.08
EBT	2	3400	453	.13	800	.24*
EBR	1	1700	155	.09	262	.15
WBL	2	3400	430	.13	313	.09*
WBT	2	3400	924	.27*	644	.19
WBR	1	1700	178	.10	222	.13
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.77		.81

230 . Culver Dr. at Main St.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	174	.05*	121	.04
NBT	3	5100	1005	.20	1937	.38*
NBR	1	1700	175	.10	514	.30
SBL	2	3400	54	.02	182	.05*
SBT	3	5100	2012	.39*	1446	.28
SBR	f		469		130	
EBL	2	3400	148	.04	517	.15
EBT	2	3400	131	.04*	446	.13*
EBR	f		122		168	
WBL	2	3400	546	.16*	170	.05*
WBT	2	3400	336	.10	79	.02
WBR	1	1700	87	.05	70	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.69		.66

231 . Culver Dr. at Paseo Westpark

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	130	.08*	150	.09
NBT	3	5100	1296	.25	2458	.48*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2584	.51*	1742	.34
SBR	d	1700	120	.07	50	.03
EBL	1	1700	67	.04*	42	.02*
EBT	0	0	0		0	
EBR	1	1700	223	.13	48	.03
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment		EBR		.03*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.71		.55

232 . Culver Dr. at I-405 NB Ramps

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	820	.16	1852	.36*
NBR	f		620		430	
SBL	0	0	0		0	
SBT	3	5100	1064	.21*	1126	.22
SBR	f		930		660	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	756	.22*	464	.14*
WBT	0	0	0		0	
WBR	1	1700	450	.26	788	.46
Right Turn Adjustment					WBR	.32*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.48		.87

233 . Culver Dr. at I-405 SB Ramps

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1115	.22	1488	.29*
NBR	f		271		650	
SBL	0	0	0		0	
SBT	3	5100	1524	.30*	1199	.24
SBR	f		251		310	
EBL	1.5		299	{.16}*	842	{.27}*
EBT	0	5100	0	.16	0	{.27}
EBR	1.5		531		591	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .51 .61

234 . Culver Dr. at Michelson Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	137	.04*	316	.09
NBT	3	5100	1007	.20	1641	.34*
NBR	0	0	16		82	
SBL	2	3400	217	.06	631	.19*
SBT	3	5100	1556	.31*	808	.16
SBR	1	1700	269	.16	311	.18
EBL	2	3400	235	.07	308	.09
EBT	1	1700	168	.10*	197	.12*
EBR	1	1700	207	.12	195	.11
WBL	1	1700	107	.06*	197	.12*
WBT	2	3400	125	.04	182	.05
WBR	1	1700	238	.14	351	.21
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .56 .82

235 . Culver Dr. at University Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	8	.00	59	.03
NBT	3	5100	1495	.29	1588	.31*
NBR	2	3400	267	.08	867	.26
SBL	1	1700	20	.01	29	.02*
SBT	3	5100	1262	.30*	1116	.28
SBR	0	0	293		289	
EBL	2	3400	51	.02	308	.09
EBT	3	5100	413	.08*	824	.17*
EBR	0	0	16		19	
WBL	2	3400	512	.15*	585	.17*
WBT	3	5100	879	.18	493	.11
WBR	0	0	24		44	
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .58 .72

337 . Von Karman Ave. at Quartz

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	421	.25*	201	.12*
NBT	2	3400	978	.29	1209	.36
NBR	1	1700	187	.11	61	.04
SBL	1	1700	168	.10	82	.05
SBT	2	3400	855	.25*	1176	.35*
SBR	d	1700	240	.14	100	.06
EBL	2	3400	43	.01*	197	.06*
EBT	1	1700	6	.00	6	.00
EBR	1	1700	61	.04	436	.26
WBL	1	1700	34	.02	56	.03
WBT	1	1700	19	.01*	11	.01*
WBR	f		58		163	
Right Turn Adjustment					EBR	.13*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .72

439 . Bixby at Michleson Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	15	.01*	27	.02*
NBT	1	1700	2	.00	2	.01
NBR	0	0	3		21	
SBL	2	3400	7	.00	87	.03
SBT	1	1700	3	.02*	3	.10*
SBR	0	0	31		160	
EBL	1	1700	142	.08*	72	.04*
EBT	2	3400	360	.12	651	.20
EBR	0	0	43		30	
WBL	1	1700	34	.02	67	.04
WBT	2	3400	563	.17*	834	.25*
WBR	1	1700	56	.03	26	.02
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .33 .46

440 . Siglo at Main St.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	161	.05*	267	.08*
SBT	0	0	0		0	
SBR	1	1700	139	.08	65	.04
EBL	2	3400	28	.01*	167	.05
EBT	3	5100	439	.09	2123	.42*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5100	1761	.35*	955	.19
WBR	1	1700	192	.11	103	.06
Right Turn Adjustment			SBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .48 .55

441 . Loop Rd. at Jamboree Rd. SB Ramps

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	11	.00	85	.03*
NBR	1	1700	18	.01	80	.05
SBL	1	1700	12	.01	10	.01*
SBT	2	3400	128	.04*	71	.02
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		521	.15*	309	.09*
WBT	0	5100	0		0	
WBR	1.5		29		45	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .24 .18

472 . Obsidian at Michelson Dr.

Y2015 WITH Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	6		21	
NBT	1	1700	0	.02*	0	.04*
NBR	0	0	24		40	
SBL	0	0	11	{.01}*	134	{.08}*
SBT	1	1700	0	.01	0	.08
SBR	f		19		79	
EBL	1	1700	84	.05*	41	.02
EBT	2	3400	295	.10	726	.22*
EBR	0	0	38		15	
WBL	1	1700	62	.04	25	.01*
WBT	2	3400	1324	.39*	711	.21
WBR	f		166		59	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .40

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineWProj\EXE-193\ICU\Y15WP-NPB01-102909

61 . Airport Wy. at Campus Dr.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	2	3200	371	.12	488	.15
EBL	1	1600	183	.11*	303	.19*
EBT	3	4800	1260	.26	950	.20
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	549	.16*	1402	.33*
WBR	0	0	207		197	
Right Turn Adjustment			SBR	.12*	SBR	.15*
TOTAL CAPACITY UTILIZATION				.39		.67

62 . Campus Dr. at Bristol St. NB

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	700	.22	834	.26*
NBT	3	4800	1849	.39*	696	.15
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6400	359	.06	901	.14*
SBR	2	3200	352	.11	1009	.32
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	253	.16	289	.18
WBT	4	6400	1192	.23*	2087	.34*
WBR	0	0	256		104	
Right Turn Adjustment					SBR	.18*
TOTAL CAPACITY UTILIZATION				.62		.92

63 . Campus Dr. at Bristol St. SB

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	5	8000	1289	.19*	910	.14*
NBR	0	0	191		251	.16
SBL	1	1600	203	.13*	242	.15*
SBT	3	4800	408	.09	977	.20
SBR	0	0	0		0	
EBL	1.5		1271	{.44}*	520	{.24}*
EBT	2.5	6400	1564	.44	1018	.24
EBR	2	3200	466	.15	503	.16
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.02*
TOTAL CAPACITY UTILIZATION				.76		.55

64 . Birch St. at Bristol St. NB

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	145	.05	179	.06*
NBT	2	3200	1055	.33*	381	.12
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	1.5	6400	237	.07	610	.26*
SBR	2.5		203	.06	1050	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		472		550	
WBT	3.5	8000	1425	.29*	1392	.26*
WBR	0		444		159	
TOTAL CAPACITY UTILIZATION				.62		.58

65 . Birch St. at Bristol St. SB

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2.5	6400	349	.10*	335	.10
NBR	1.5		267		375	.12
SBL	2	3200	236	.07*	369	.12
SBT	2	3200	400	.13	801	.25*
SBR	0	0	0		0	
EBL	1.5		631	{.21}*	185	
EBT	3	8000	867	.21	1226	.19*
EBR	0.5		220		129	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .38 .44

84 . MacArthur Bl. at Campus Dr.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	73	.05	116	.07
NBT	4	6400	1048	.16*	1014	.16*
NBR	1	1600	109	.07	80	.05
SBL	1	1600	274	.17*	205	.13*
SBT	4	6400	986	.15	1056	.17
SBR	1	1600	280	.18	709	.44
EBL	2	3200	404	.13*	344	.11*
EBT	3	4800	797	.17	636	.13
EBR	d	1600	99	.06	100	.06
WBL	2	3200	94	.03	116	.04
WBT	3	4800	508	.11*	1089	.23*
WBR	f		168		155	
Right Turn Adjustment					SBR	.22*

TOTAL CAPACITY UTILIZATION .57 .85

85 . MacArthur Bl. at Birch St.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	63	.04	126	.08*
NBT	3	4800	1855	.39*	1235	.26
NBR	f		109		27	
SBL	1	1600	126	.08*	81	.05
SBT	4	6400	788	.15	2153	.36*
SBR	0	0	195		179	
EBL	1.5		129	{.08}*	302	{.12}*
EBT	1.5	4800	385	.12	252	.12
EBR	0		73		26	
WBL	1	1600	39	.02	111	.07
WBT	2	3200	332	.10*	756	.24*
WBR	f		75		143	

TOTAL CAPACITY UTILIZATION .65 .80

105 . Von Karman Av. at Campus Dr.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	18	.01	78	.05*
NBT	2	3200	713	.22*	543	.17
NBR	f		59		171	
SBL	1	1600	51	.03*	231	.14
SBT	2	3200	477	.18	953	.38*
SBR	0	0	111		278	
EBL	1	1600	269	.17*	219	.14*
EBT	2	3200	429	.13	627	.20
EBR	f		43		57	
WBL	1	1600	110	.07	110	.07
WBT	2	3200	501	.19*	783	.27*
WBR	0	0	118		78	

TOTAL CAPACITY UTILIZATION .61 .84

106 . Von Karman Av. at Birch St.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	33	.02	77	.05*
NBT	2	3200	553	.19*	538	.20
NBR	0	0	62		98	
SBL	1	1600	63	.04*	41	.03
SBT	2	3200	312	.16	628	.26*
SBR	0	0	206		204	
EBL	1	1600	90	.06*	138	.09*
EBT	2	3200	224	.08	241	.09
EBR	0	0	45		33	
WBL	1	1600	93	.06	29	.02
WBT	2	3200	371	.12*	359	.13*
WBR	0	0	28		64	

TOTAL CAPACITY UTILIZATION .41 .53

107 . Von Karman Av. at MacArthur Bl.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	33	.02*	142	.09
NBT	2	3200	98	.03	230	.07*
NBR	f		31		180	
SBL	2	3200	109	.03	696	.22*
SBT	1	1600	150	.09*	104	.07
SBR	f		23		63	
EBL	1	1600	55	.03*	54	.03
EBT	3	4800	390	.08	894	.19*
EBR	f		160		54	
WBL	1	1600	100	.06	43	.03*
WBT	3	4800	1024	.21*	636	.13
WBR	f		717		156	

TOTAL CAPACITY UTILIZATION .35 .51

121 . Teller Av. at Campus Dr.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	5	.00	30	.02*
NBT	1	1600	48	.03	109	.07
NBR	1	1600	27	.02	62	.04
SBL	1	1600	54	.03	152	.10
SBT	1	1600	164	.17*	117	.16*
SBR	0	0	102		132	
EBL	1	1600	75	.05*	70	.04
EBT	2	3200	381	.12	867	.27*
EBR	f		26		22	
WBL	1	1600	61	.04	51	.03*
WBT	2	3200	557	.25*	429	.17
WBR	0	0	238		101	

TOTAL CAPACITY UTILIZATION .47 .48

147 . Jamboree Rd. at Campus Dr.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	175	.05*	112	.04
NBT	4	6400	1328	.22	1891	.36*
NBR	0	0	56		417	
SBL	2	3200	277	.09	370	.12*
SBT	3	4800	1795	.41*	1726	.40
SBR	0	0	155		194	
EBL	2	3200	177	.06	406	.13*
EBT	2	3200	297	.09*	543	.17
EBR	f		47		250	
WBL	2	3200	517	.16*	143	.04
WBT	2	3200	450	.14	374	.12*
WBR	1	1600	195	.12	253	.16
Right Turn Adjustment					WBR	.04*

TOTAL CAPACITY UTILIZATION .71 .77

148 . Jamboree Rd. at Birch St.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	151	.09*	134	.08*
NBT	3	4800	1454	.30	1852	.39
NBR	0	0	1		1	
SBL	1	1600	5	.00	1	.00
SBT	3	4800	1846	.38*	1867	.39*
SBR	f		519		186	
EBL	1.5		126	{.04}*	408	{.13}*
EBT	0.5	3200	2	.04	0	.13
EBR	f		24		143	
WBL	0	0	0		0	
WBT	1	1600	0	.00*	0	.00*
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .51 .60

149 . Jamboree Rd. at Fairchild Rd.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	8	.01	17	.01
NBT	3	4800	1674	.36*	1778	.38*
NBR	0	0	36		25	
SBL	2	3200	314	.10*	283	.09*
SBT	4	6400	1728	.27	1879	.29
SBR	d	1600	10	.01	3	.00
EBL	1	1600	5	.00	62	.04
EBT	1	1600	0	.00	24	.07*
EBR	0	0	5		95	
WBL	1	1600	6	.00	19	.01*
WBT	1	1600	2	.00*	11	.01
WBR	1	1600	311	.19	295	.18
Right Turn Adjustment			WBR	.19*	WBR	.14*

TOTAL CAPACITY UTILIZATION .65 .69

150 . Jamboree Rd. at MacArthur Bl.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	509	.16*	220	.07
NBT	3	4800	999	.21	1083	.23*
NBR	1	1600	232	.15	50	.03
SBL	2	3200	407	.13	623	.19*
SBT	3	4800	1008	.21*	1270	.26
SBR	1	1600	225	.14	119	.07
EBL	2	3200	107	.03*	210	.07
EBT	3	4800	390	.08	1267	.26*
EBR	f		143		286	
WBL	2	3200	189	.06	304	.10*
WBT	3	4800	1717	.36*	651	.14
WBR	1	1600	574	.36	447	.28

TOTAL CAPACITY UTILIZATION .76 .78

151 . Jamboree Rd. at Bristol St. NB-SR73 NB Ramps

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	1013	.32	756	.24
NBT	1.5	4800	1570	.49*	2130	.67*
NBR	1.5		0		0	
SBL	0	0	0		0	
SBT	2.5	6400	660	.17	1210	.30
SBR	1.5		407		734	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .49 .67

153 . Jamboree Rd. at Bristol St. SB

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	5	8000	2096	.27*	1959	.26*
NBR	0	0	63		100	
SBL	0	0	0		0	
SBT	3	4800	720	.15	1131	.24
SBR	0	0	0		0	
EBL	1.5		984	.31*	1051	{.41}*
EBT	1.5	4800	377	.24	900	.41
EBR	2	3200	1130	.35	1249	.39
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.04*		

TOTAL CAPACITY UTILIZATION .62 .67

154 . Jamboree Rd. at Eastbluff Dr.-University Dr.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	76	.05	44	.03*
NBT	3	4800	1574	.33*	1448	.30
NBR	1	1600	223	.14	275	.17
SBL	2	3200	74	.02*	160	.05
SBT	3	4800	1361	.28	1998	.42*
SBR	1	1600	343	.21	466	.29
EBL	1.5		414	{.18}*	244	{.12}*
EBT	0.5	3200	124	.18	115	.12
EBR	0		33		30	
WBL	1.5		307		242	
WBT	1.5	4800	171	.10*	150	.08*
WBR	f		182		98	

TOTAL CAPACITY UTILIZATION .63 .65

155 . Jamboree Rd. at Bison Av.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	1459	.30*	1723	.36
NBR	d	1600	191	.12	152	.10
SBL	2	3200	209	.07*	218	.07
SBT	3	4800	1649	.34	2112	.44*
SBR	1	1600	200	.13	120	.08
EBL	1	1600	125	.08*	68	.04
EBT	0	0	0		0	
EBR	1	1600	65	.04	33	.02
WBL	2	3200	140	.04	294	.09*
WBT	0	0	0		0	
WBR	2	3200	200	.06	220	.07
Right Turn Adjustment			WBR	.06*	Multi	.04*

TOTAL CAPACITY UTILIZATION .51 .57

156 . Jamboree Rd. at Ford Rd.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	350	.11*	356	.11*
NBT	3	4800	1408	.32	1838	.43
NBR	0	0	113		232	
SBL	1	1600	63	.04	49	.03
SBT	3	4800	1599	.33*	2263	.47*
SBR	1	1600	144	.09	48	.03
EBL	1.5		221	{.10}*	63	.04
EBT	1.5	4800	243	.10	219	.07*
EBR	1	1600	277	.17	250	.16
WBL	1.5		174	.11	207	{.08}*
WBT	1.5	4800	396	.12*	166	.08
WBR	1	1600	41	.03	39	.02
Right Turn Adjustment			EBR	.06*	EBR	.09*

TOTAL CAPACITY UTILIZATION .72 .82

176 . Fairchild Av. at MacArthur Bl.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	30	.02*	421	.26*
SBT	0	0	0		0	
SBR	1	1600	20	.01	179	.11
EBL	1	1600	274	.17*	36	.02
EBT	3	4800	760	.16	1735	.36*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	2480	.63*	1224	.28
WBR	0	0	566		104	

TOTAL CAPACITY UTILIZATION .82 .62

178 . MacArthur Bl. at Bison Av.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	221	.07	218	.07*
NBT	4	6400	2626	.41*	2530	.40
NBR	1	1600	154	.10	190	.12
SBL	2	3200	76	.02*	231	.07
SBT	4	6400	2080	.33	2867	.45*
SBR	1	1600	293	.18	363	.23
EBL	2	3200	241	.08	219	.07
EBT	2	3200	220	.07*	219	.07*
EBR	f		169		251	
WBL	2	3200	370	.12*	356	.11*
WBT	2	3200	226	.07	279	.09
WBR	1	1600	93	.06	134	.08

TOTAL CAPACITY UTILIZATION .62 .70

179 . MacArthur Bl. at Ford Rd.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	128	.04	65	.02
NBT	4	6400	2044	.32*	2424	.38*
NBR	f		83		477	
SBL	2	3200	556	.17*	847	.26*
SBT	4	6400	1953	.31	2449	.38
SBR	f		16		56	
EBL	2	3200	44	.01	30	.01
EBT	2	3200	281	.09*	326	.10*
EBR	1	1600	124	.08	64	.04
WBL	2	3200	534	.17*	237	.07*
WBT	2	3200	386	.12	309	.10
WBR	f		962		516	

TOTAL CAPACITY UTILIZATION .75 .81

194 . MacArthur Blvd. SB at University Dr.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	34	.02*	74	.05*
NBT	0	0	0		0	
NBR	1	1600	277	.17	116	.07
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	958	.22*	1014	.22*
EBR	0	0	75		54	
WBL	2	3200	146	.05*	326	.10*
WBT	3	4800	890	.19	746	.16
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.15*	NBR	.02*

TOTAL CAPACITY UTILIZATION .44 .39

195 . SR-73 SB Ramps at University Dr.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	600	.38*	560	.35*
SBT	0	0	0		0	
SBR	1	1600	78	.05	169	.11
EBL	0	0	0		0	
EBT	3	4800	459	.10	630	.13*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	553	.12*	551	.11
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .50 .48

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineWProj\EXE-193\ICU\Y15WP-NPB02-102909

733 . Irvine Av. at Mesa Dr.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	90	.06	48	.03*
NBT	2	3200	868	.27*	647	.20
NBR	d	1600	269	.17	185	.12
SBL	1	1600	20	.01*	14	.01
SBT	2	3200	530	.17	1272	.40*
SBR	d	1600	65	.04	183	.11
EBL	1	1600	108	.07	43	.03
EBT	1	1600	192	.15*	121	.16*
EBR	0	0	52		138	
WBL	1	1600	208	.13*	441	.28*
WBT	1	1600	55	.03	429	.27
WBR	1	1600	15	.01	30	.02

TOTAL CAPACITY UTILIZATION .56 .87

734 . Irvine Av. at University Dr.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	118	.07	120	.08*
NBT	2	3200	1166	.36*	781	.24
NBR	1	1600	1	.00	24	.02
SBL	1	1600	100	.06*	42	.03
SBT	2	3200	628	.20	1620	.51*
SBR	1	1600	77	.05	120	.08
EBL	1	1600	163	.10*	83	.05*
EBT	1	1600	39	.02	33	.02
EBR	1	1600	107	.07	134	.08
WBL	1	1600	14	.01	46	.03
WBT	1	1600	15	.01*	29	.02*
WBR	d	1600	21	.01	36	.02
Right Turn Adjustment					EBR	.04*

TOTAL CAPACITY UTILIZATION .53 .70

741 . Jamboree Av. at San Joaquin Hills Rd.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	36	.02	62	.04
NBT	3	4800	1193	.25*	1647	.34*
NBR	f		101		145	
SBL	2	3200	704	.22*	547	.17*
SBT	3	4800	1280	.27	1891	.39
SBR	f		44		125	
EBL	1.5		278	.09*	172	.05*
EBT	1.5	4800	27	.02	38	.02
EBR	f		47		52	
WBL	1.5		186	.06	197	.06
WBT	1.5	4800	20	.01*	43	.03*
WBR	1	1600	82	.05	81	.05
Right Turn Adjustment			WBR	.04*	WBR	.02*

TOTAL CAPACITY UTILIZATION .61 .61

742 . MacArthur Blvd. at San Joaquin Hills Rd.

Y2015 WITH Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	138	.04*	113	.04
NBT	3	4800	1348	.28	1928	.40*
NBR	1	1600	197	.12	30	.02
SBL	2	3200	266	.08	550	.17*
SBT	3	4800	1789	.37*	1962	.41
SBR	f		481		245	
EBL	2	3200	454	.14*	573	.18*
EBT	3	4800	107	.03	401	.12
EBR	0	0	39		177	
WBL	1	1600	12	.01	50	.03
WBT	2	3200	421	.13*	312	.10*
WBR	f		538		539	

TOTAL CAPACITY UTILIZATION .68 .85

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineWProj\EXE-193\ICU\Y15WP-SAN01-102909

4 . SR-55 SB Ramps at Edinger Av.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		434	{.14}*	320	
NBT	0.5	3400	57	.14	58	.11*
NBR	2	3400	409	.12	242	.07
SBL	1	1700	67	.04	153	.09*
SBT	1	1700	30	.04*	79	.07
SBR	0	0	33		48	
EBL	1	1700	41	.02	50	.03
EBT	3	5100	1064	.21*	1385	.27*
EBR	f		246		239	
WBL	2	3400	435	.13*	372	.11*
WBT	3	5100	1383	.29	993	.21
WBR	0	0	101		92	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .63

5 . Hotel Terrace Dr. at Dyer Rd.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		179	{.06}*	168	{.05}*
NBT	0.5	3400	11	.06	11	.05
NBR	2	3400	319	.09	81	.02
SBL	0.5		94		97	
SBT	1.5	3400	165	.08*	476	.17*
SBR	1	1700	40	.02	147	.09
EBL	1	1700	60	.04	135	.08
EBT	3	5100	1051	.21*	1036	.20*
EBR	1	1700	320	.19	169	.10
WBL	2	3400	487	.14*	602	.18*
WBT	3	5100	913	.18	963	.19
WBR	1	1700	189	.11	45	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .65

6 . Grand Av. at Dyer Rd.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	458	.13*	711	.21*
SBT	0	0	0		0	
SBR	1	1700	453	.27	312	.18
EBL	1	1700	208	.12*	334	.20*
EBT	3	5100	1248	.24	979	.19
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	1182	.35*	1348	.40*
WBR	f		711		386	
Right Turn Adjustment			SBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .70 .86

7 . SR-55 NB Ramps at Dyer Rd.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		830	{.30}*	238	.07*
NBT	0	5100	0	.30	0	
NBR	1.5		700		83	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1890	.37*	1177	.23
EBR	f		550		1020	
WBL	0	0	0		0	
WBT	2.5	5100	1100	.29	1602	.47*
WBR	0.5		360		1250	.74
Right Turn Adjustment					WBR	.22*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .81

8 . SR-55 SB Ramps at MacArthur Blvd.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	886	.26*	308	.09*
SBT	0	0	0		0	
SBR	2	3400	943	.28	760	.22
EBL	0	0	0		0	
EBT	2	3400	1331	.39*	1302	.38*
EBR	f		752		980	
WBL	0	0	0		0	
WBT	3	5100	1406	.28	1770	.35
WBR	f		153		710	
Right Turn Adjustment					SBR	.11*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .70 .63

9 . SR-55 NB Ramps at MacArthur Blvd.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1018	.30*	684	.20*
NBT	0	0	0		0	
NBR	f		692		275	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	1358	.40*	937	.28
EBR	f		620		761	
WBL	0	0	0		0	
WBT	3	5100	772	.15	1720	.34*
WBR	f		350		1172	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .75 .59

28 . Pullman St. at Warner Av.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		65		144	
NBT	0.5	1700	15	.05*	8	.09*
NBR	1	1700	63	.04	99	.06
SBL	0	0	26	{.02}*	100	{.06}*
SBT	2	3400	15	.02	30	.05
SBR	0	0	10		111	.07
EBL	1	1700	58	.03	40	.02*
EBT	3	5100	1281	.28*	1460	.30
EBR	0	0	167		64	
WBL	1	1700	68	.04*	56	.03
WBT	3	5100	1375	.28	1585	.32*
WBR	0	0	67		23	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .44 .54

29 . Pullman St. at Barranca Pkwy.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	165	.05*	678	.20*
NBT	1	1700	25	.03	14	.05
NBR	0	0	32		69	
SBL	1	1700	34	.02	26	.02
SBT	0.5	3400	22	{.01}*	10	{.08}*
SBR	1.5		106		385	
EBL	1	1700	302	.18*	185	.11*
EBT	3	5100	1084	.30	982	.21
EBR	0	0	428		106	
WBL	1	1700	50	.03	55	.03
WBT	3	5100	1019	.20*	1677	.33*
WBR	0	0	24		22	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .49 .77

543 . Bristol St. at Segerstrom Av.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	67	.04*	163	.10
NBT	3	5100	741	.15	1251	.25*
NBR	d	1700	175	.10	279	.16
SBL	1	1700	210	.12	170	.10*
SBT	3	5100	1083	.23*	921	.20
SBR	0	0	89		101	
EBL	1	1700	193	.11	229	.13*
EBT	2	3400	755	.24*	691	.27
EBR	0	0	64		212	
WBL	1	1700	163	.10*	196	.12
WBT	2	3400	554	.19	826	.28*
WBR	0	0	85		110	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .81

544 . Bristol St. at MacArthur Blvd.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	93	.03*	444	.13*
NBT	3	5100	637	.12	1384	.27
NBR	1	1700	111	.07	332	.20
SBL	2	3400	229	.07	276	.08
SBT	3	5100	1099	.24*	982	.23*
SBR	0	0	131		172	
EBL	2	3400	216	.06	351	.10*
EBT	3	5100	1280	.25*	812	.16
EBR	1	1700	144	.08	158	.09
WBL	2	3400	167	.05*	351	.10
WBT	3	5100	1096	.21	1464	.29*
WBR	1	1700	157	.09	256	.15
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .80

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineWProj\EXE-193\ICU\Y15WP-SAN01-102909

719 . Flower St. at Segerstrom Av.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	103	.06	88	.05*
NBT	2	3400	554	.19*	345	.14
NBR	0	0	92		126	
SBL	1	1700	83	.05*	156	.09
SBT	2	3400	337	.12	709	.23*
SBR	0	0	60		76	
EBL	1	1700	97	.06	98	.06*
EBT	2	3400	858	.33*	648	.23
EBR	0	0	265		124	
WBL	1	1700	80	.05*	47	.03
WBT	2	3400	619	.20	926	.29*
WBR	0	0	51		76	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .68

720 . Flower St. at MacArthur Blvd.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	25	.01*	47	.03
NBT	2	3400	165	.07	556	.19*
NBR	0	0	70		80	
SBL	1	1700	136	.08	88	.05*
SBT	2	3400	264	.15*	186	.09
SBR	0	0	230		117	
EBL	1	1700	218	.13*	162	.10*
EBT	3	5100	1304	.26	1062	.22
EBR	0	0	38		52	
WBL	1	1700	48	.03	61	.04
WBT	3	5100	805	.17*	1927	.41*
WBR	0	0	77		142	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .51 .80

723 . Main St. at Dyer Rd.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	67	.04*	150	.09
NBT	2	3400	437	.13	972	.29*
NBR	1	1700	186	.11	398	.23
SBL	1	1700	208	.12	109	.06*
SBT	3	5100	962	.22*	565	.14
SBR	0	0	159		155	
EBL	1	1700	179	.11	131	.08*
EBT	2	3400	909	.27*	584	.17
EBR	1	1700	162	.10	64	.04
WBL	1	1700	149	.09*	162	.10
WBT	2	3400	756	.22	847	.25*
WBR	1	1700	106	.06	139	.08
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .73

724 . Main St. at Alton Pkwy.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	12	.01*	28	.02
NBT	3	5100	713	.15	1463	.29*
NBR	0	0	44		38	
SBL	1	1700	86	.05	62	.04*
SBT	3	5100	1185	.23*	686	.14
SBR	0	0	7		29	
EBL	0	0	0		0	
EBT	1	1700	0	.00	0	.00
EBR	0	0	0		0	
WBL	0.5		35		57	
WBT	0.5	1700	2	.02*	1	.03*
WBR	1	1700	37	.02	73	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .31 .41

725 . Main St. at MacArthur Blvd.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	51	.02	352	.10
NBT	3	5100	288	.06*	661	.13*
NBR	1	1700	212	.12	419	.25
SBL	2	3400	415	.12*	239	.07*
SBT	3	5100	594	.12	433	.08
SBR	1	1700	153	.09	300	.18
EBL	2	3400	271	.08	300	.09*
EBT	3	5100	1603	.31*	732	.14
EBR	1	1700	160	.09	60	.04
WBL	2	3400	306	.09*	237	.07
WBT	3	5100	856	.17	1357	.27*
WBR	1	1700	301	.18	410	.24
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .63 .62

727 . Halladay St. at Dyer Rd.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	8	.00	40	.02
NBT	1	1700	15	.07*	93	.19*
NBR	0	0	97		228	
SBL	1	1700	245	.14*	155	.09*
SBT	1	1700	54	.08	47	.06
SBR	0	0	90		59	
EBL	1	1700	81	.05	138	.08*
EBT	3	5100	1149	.23*	1117	.22
EBR	0	0	12		9	
WBL	1	1700	183	.11*	94	.06
WBT	3	5100	742	.17	1110	.24*
WBR	0	0	134		99	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .65

728 . Halladay St. E at Alton Pkwy.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0.5		28		46	
SBT	0	1700	0	.16*	0	.09*
SBR	0.5		252		114	
EBL	1	1700	98	.06*	316	.19*
EBT	1	1700	52	.03	34	.02
EBR	0	0	0		0	
WBL	1	1700	0	.00	0	.00
WBT	1	1700	18	.01*	56	.03*
WBR	1	1700	32	.02	54	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .28 .36

729 . Halladay St. W at Alton Pkwy.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		2		24	
NBT	0.5	1700	0	.04*	0	.16*
NBR	0		69		246	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	1	1700	81	.06*	94	.06
EBR	0	0	29		7	
WBL	0.5		201	{.12}*	83	
WBT	0.5	1700	68	.16	96	.11*
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .27 .32

730 . Grand Av. at Warner Av.

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	176	.10	247	.15
NBT	3	5100	595	.17*	598	.15*
NBR	0	0	255		185	
SBL	1	1700	281	.17*	313	.18*
SBT	3	5100	478	.14	538	.16
SBR	0	0	277	.16	319	.19
EBL	2	3400	385	.11*	417	.12*
EBT	3	5100	974	.19	895	.18
EBR	1	1700	161	.09	158	.09
WBL	2	3400	181	.05	202	.06
WBT	2	3400	857	.25*	1129	.33*
WBR	1	1700	290	.17	379	.22
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .75 .83

731 . Grand Av. at SR-55 SB Ramps

Y2015 WITH Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	889	.26*	730	.21*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	571	.11	710	.14
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	362	.21*	330	.19*
WBT	0	0	0		0	
WBR	1	1700	358	.21	240	.14
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .45

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineWProj\EXE-193\ICU\Y15WP-TUS01-102909

3 . Newport Av. at Edinger Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	571	.17*	694	.20*
NBT	0	0	0		0	
NBR	2	3400	88	.03	115	.03
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1032	.20*	855	.17*
EBR	1	1700	983	.58	841	.49
WBL	1	1700	337	.20*	369	.22*
WBT	3	5100	1419	.28	896	.18
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.21*	EBR	.12*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .83 .76

14 . Walnut Av. at McFadden St.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	333	.10*	519	.15*
NBT	0	0	0		0	
NBR	1	1700	13	.01	89	.05
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	383	.22*	541	.27*
EBR	0	0	351		377	
WBL	1	1700	36	.02*	43	.03*
WBT	2	3400	784	.23	451	.13
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .39 .50

18 . Newport Av. at Bryan Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	69	.04*	131	.08
NBT	3	5100	544	.11	1259	.25*
NBR	0	0	17		38	
SBL	1	1700	63	.04	120	.07*
SBT	3	5100	1760	.35*	1046	.21
SBR	0	0	44		27	
EBL	1	1700	12	.01*	39	.02
EBT	1	1700	24	.01	64	.04*
EBR	1	1700	74	.04	180	.11
WBL	1	1700	33	.02	55	.03*
WBT	1	1700	62	.04*	74	.04
WBR	1	1700	207	.12	386	.23
Right Turn Adjustment					WBR	.13*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .49 .57

19 . Newport Av. at Main St.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	108	.06*	165	.10*
NBT	3	5100	431	.09	1217	.26
NBR	0	0	49		109	
SBL	1	1700	84	.05	76	.04
SBT	3	5100	317	.09*	960	.21*
SBR	0	0	160	.09	133	
EBL	1	1700	49	.03	159	.09*
EBT	2	3400	107	.03*	315	.09
EBR	1	1700	174	.10	196	.12
WBL	1	1700	249	.15*	224	.13
WBT	2	3400	242	.07	512	.15*
WBR	1	1700	10	.01	34	.02
Right Turn Adjustment			EBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .40 .60

20 . Newport Av. at El Camino Real

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	231	.14*	249	.15*
NBT	3	5100	699	.16	1158	.26
NBR	0	0	140		191	
SBL	1	1700	91	.05	172	.10
SBT	3	5100	1626	.32*	979	.21*
SBR	0	0	20		75	
EBL	1	1700	9	.01	45	.03
EBT	1	1700	99	.06*	257	.15*
EBR	1	1700	333	.20	261	.15
WBL	1	1700	171	.10*	220	.13*
WBT	2	3400	179	.07	346	.13
WBR	0	0	61		107	
Right Turn Adjustment			EBR	.03*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.70		.69

21 . Newport Av. at I-5 NB Ramps

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	258	.15*	312	.18*
NBT	3	5100	1180	.23	1940	.38
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1830	.44*	1250	.33*
SBR	0	0	412		428	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.64		.56

22 . Newport Av. at Nisson Rd.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1068	.22*	1658	.34*
NBR	0	0	62		71	
SBL	1	1700	196	.12*	230	.14*
SBT	3	5100	1564	.31	1101	.22
SBR	0	0	0		0	
EBL	1.5		372		408	
EBT	0.5	3400	62	.13*	45	.13*
EBR	1	1700	336	.20	548	.32
WBL	1	1700	30	.02*	69	.04*
WBT	0	0	0		0	
WBR	1	1700	110	.06	181	.11
Right Turn Adjustment			EBR	.05*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.59		.70

23 . Newport Av. at McFadden St.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	39	.02*	53	.03*
NBT	3	5100	761	.15	1189	.24
NBR	0	0	11		16	
SBL	1	1700	18	.01	40	.02
SBT	3	5100	1457	.43*	937	.27*
SBR	0	0	911	.54	436	
EBL	2	3400	319	.09*	544	.16*
EBT	0	0	1		10	
EBR	1	1700	63	.04	31	.02
WBL	0	0	0		0	
WBT	1	1700	0	.00*	0	.00*
WBR	0	0	0		0	
Right Turn Adjustment			SBR	.04*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.63		.51

24 . Newport Av. at Walnut Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	38	.02	120	.07
NBT	3	5100	650	.15*	868	.19*
NBR	0	0	92		108	
SBL	1	1700	611	.36*	460	.27*
SBT	3	5100	915	.19	604	.13
SBR	0	0	34		56	
EBL	1	1700	61	.04*	36	.02*
EBT	2	3400	227	.09	313	.11
EBR	0	0	92		72	
WBL	1	1700	143	.08	125	.07
WBT	2	3400	277	.16*	414	.24*
WBR	0	0	319	.19	527	.31
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .77

25 . Newport Av. at Sycamore Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	218	.13*	352	.21
NBT	2	3400	279	.11	759	.28*
NBR	0	0	90		208	
SBL	1	1700	231	.14	282	.17*
SBT	3	5100	967	.21*	578	.13
SBR	0	0	123		102	
EBL	1	1700	230	.14*	96	.06*
EBT	1	1700	49	.09	32	.05
EBR	0	0	106		51	
WBL	0.5		177		134	
WBT	1.5	3400	149	.13*	256	.17*
WBR	0		131		180	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .73

27 . Del Amo Av. at Edinger Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		65	{.02}*	223	{.07}*
NBT	0.5	3400	4	.02	0	.07
NBR	1	1700	267	.16	199	.12
SBL	0	0	0		0	
SBT	1	1700	0	.00*	0	.00*
SBR	0	0	0		0	
EBL	1	1700	13	.01*	7	.00
EBT	3	5100	987	.19	881	.17
EBR	d	1700	101	.06	77	.05
WBL	2	3400	210	.06	173	.05
WBT	3	5100	1360	.27*	1327	.26*
WBR	d	1700	0	.00	0	.00
Right Turn Adjustment		NBR		.06*		
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .41 .38

35 . Red Hill Av. at Bryan Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	134	.08*	172	.10
NBT	2	3400	417	.12	788	.23*
NBR	1	1700	173	.10	110	.06
SBL	1	1700	96	.06	120	.07*
SBT	2	3400	830	.24*	456	.13
SBR	1	1700	73	.04	44	.03
EBL	1	1700	44	.03*	41	.02*
EBT	2	3400	401	.14	484	.18
EBR	0	0	86		134	
WBL	1	1700	135	.08	132	.08
WBT	2	3400	583	.21*	694	.25*
WBR	0	0	129		153	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .62

36 . Red Hill Av. at El Camino Real

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	233	.07*	368	.11
NBT	3	5100	659	.13	804	.16*
NBR	1	1700	188	.11	395	.23
SBL	1	1700	92	.05	305	.18*
SBT	3	5100	1285	.26*	593	.13
SBR	0	0	43		49	
EBL	1	1700	90	.05	26	.02
EBT	1.5	5100	249	{.08}*	990	.29*
EBR	1.5		252		135	
WBL	1.5		480	{.16}*	392	{.23}*
WBT	1.5	5100	243	.16	953	.30
WBR	0		76		171	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .91

37 . Red Hill Av. at Nisson Rd.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01*	16	.01
NBT	4	6800	829	.13	1485	.22*
NBR	0	0	28		38	
SBL	1	1700	123	.07	148	.09*
SBT	3	5100	1591	.31*	739	.14
SBR	d	1700	84	.05	54	.03
EBL	1	1700	219	.13*	220	.13*
EBT	1	1700	53	.05	134	.09
EBR	0	0	30		26	
WBL	1	1700	30	.02	55	.03
WBT	1	1700	39	.15*	99	.16*
WBR	0	0	213		175	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .65

38 . Red Hill Av. at Walnut Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	193	.11
NBT	3	5100	370	.09	1548	.34*
NBR	0	0	110		170	
SBL	1	1700	105	.06	179	.11*
SBT	3	5100	1266	.28*	452	.12
SBR	0	0	139		185	
EBL	1	1700	155	.09	201	.12*
EBT	2	3400	383	.20*	341	.12
EBR	0	0	292		73	
WBL	2	3400	202	.06*	184	.05
WBT	2	3400	392	.16	512	.20*
WBR	0	0	157		171	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .82

39 . Red Hill Av. at Sycamore Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	58	.03*	348	.20
NBT	3	5100	607	.13	1861	.38*
NBR	0	0	35		102	
SBL	1	1700	51	.03	114	.07*
SBT	3	5100	1704	.35*	651	.16
SBR	0	0	92		154	
EBL	1	1700	70	.04*	74	.04*
EBT	1	1700	24	.01	33	.02
EBR	1	1700	142	.08	123	.07
WBL	1	1700	103	.06	47	.03
WBT	1	1700	101	.06*	28	.02*
WBR	1	1700	73	.04	55	.03
Right Turn Adjustment			EBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .56

40 . Red Hill Av. at Edinger Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	105	.03*	253	.07
NBT	3	5100	238	.05	1546	.30*
NBR	1	1700	176	.10	501	.29
SBL	2	3400	156	.05	119	.04*
SBT	3	5100	1243	.24*	348	.07
SBR	1	1700	264	.16	154	.09
EBL	2	3400	161	.05	254	.07*
EBT	3	5100	708	.14*	726	.14
EBR	1	1700	275	.16	129	.08
WBL	2	3400	642	.19*	206	.06
WBT	3	5100	1151	.23	821	.16*
WBR	1	1700	92	.05	314	.18
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR EBR

TOTAL CAPACITY UTILIZATION .65 .62

41 . Red Hill Av. at Warner Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	450	.13*	654	.19
NBT	3	5100	418	.08	1724	.34*
NBR	1	1700	35	.02	99	.06
SBL	2	3400	36	.01	63	.02*
SBT	3	5100	1503	.29*	577	.11
SBR	1	1700	562	.33	357	.21
EBL	2	3400	235	.07*	303	.09
EBT	3	5100	815	.16	1414	.28*
EBR	1	1700	343	.20	280	.16
WBL	2	3400	38	.01	61	.02*
WBT	3	5100	1486	.29*	1094	.21
WBR	1	1700	70	.04	76	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .83 .71

55 . Browning Av. at Bryan Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	54	.03	64	.04
NBT	2	3400	300	.09*	539	.16*
NBR	d	1700	196	.12	38	.02
SBL	1	1700	99	.06*	46	.03*
SBT	2	3400	141	.04	95	.03
SBR	d	1700	69	.04	51	.03
EBL	1	1700	50	.03	49	.03
EBT	2	3400	679	.20*	1066	.31*
EBR	d	1700	51	.03	66	.04
WBL	1	1700	79	.05*	60	.04*
WBT	2	3400	178	.05	225	.07
WBR	1	1700	133	.08	122	.07
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .59

56 . Browning Av. at El Camino Real

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	110	.06*	23	.01*
SBT	0	0	0		0	
SBR	1	1700	248	.15	88	.05
EBL	0	0	163	{.10}*	195	{.11}*
EBT	2	3400	220	.11	347	.16
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1700	302	.18*	602	.35*
WBR	1	1700	17	.01	75	.04
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .40 .52

58 . Browning Av. at Walnut Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	181	.11*	98	.06*
SBT	0	0	0		0	
SBR	1	1700	139	.08	51	.03
EBL	1	1700	109	.06*	67	.04*
EBT	2	3400	724	.21	641	.19
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	565	.20*	1044	.43*
WBR	0	0	113		409	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .42 .58

92 . Tustin Ranch Rd. at Bryan Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	138	.08*	568	.33
NBT	3	5100	547	.11	2131	.42*
NBR	1	1700	63	.04	168	.10
SBL	1	1700	105	.06	90	.05*
SBT	3	5100	2276	.45*	657	.13
SBR	1	1700	121	.07	155	.09
EBL	2	3400	61	.02	103	.03*
EBT	2	3400	322	.09*	633	.19
EBR	1	1700	357	.21	186	.11
WBL	2	3400	298	.09*	186	.05
WBT	2	3400	211	.06	817	.24*
WBR	d	1700	52	.03	146	.09
Right Turn Adjustment		EBR		.04*		
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR EBR

TOTAL CAPACITY UTILIZATION .80 .79

93 . Tustin Ranch Rd. at El Camino Real

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	132	.04*	526	.15
NBT	3	5100	513	.10	2508	.49*
NBR	d	1700	118	.07	336	.20
SBL	2	3400	76	.02	147	.04*
SBT	3	5100	2735	.54*	858	.17
SBR	d	1700	123	.07	55	.03
EBL	1	1700	132	.08	82	.05
EBT	2	3400	127	.07*	287	.14*
EBR	0	0	523	.31	191	
WBL	1	1700	281	.17*	251	.15*
WBT	2	3400	165	.07	389	.21
WBR	0	0	85		330	
Right Turn Adjustment		EBR		.21*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION 1.08 .87

94 . Tustin Ranch Rd. at I-5 NB Ramps

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	315	.09*	621	.18*
NBT	3	5100	1039	.20	1882	.37
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2630	.52*	1073	.21*
SBR	f		55		499	
EBL	1.5		151	{.07}*	338	.10*
EBT	0	5100	0	{.07}	0	
EBR	1.5		300		237	{.00}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .73 .54

95 . Tustin Ranch Rd. at I-5 SB Ramps

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	159	.05*	168	.05
NBT	3	5100	1008	.20	1907	.37*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2382	.47*	1021	.20
SBR	d	1700	552	.32	303	.18
EBL	1.5		755	{.31}*	666	.20*
EBT	0	5100	0	{.31}	0	
EBR	1.5		874		414	{.12}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .88 .62

96 . Tustin Ranch Rd. at Walnut Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	61	.02	197	.06
NBT	3	5100	523	.10*	1308	.26*
NBR	d	1700	152	.09	244	.14
SBL	2	3400	939	.28*	348	.10*
SBT	3	5100	1636	.32	627	.12
SBR	d	1700	383	.23	275	.16
EBL	2	3400	291	.09	260	.08*
EBT	2	3400	749	.22*	450	.13
EBR	d	1700	147	.09	91	.05
WBL	2	3400	257	.08*	173	.05
WBT	2	3400	526	.15	670	.20*
WBR	d	1700	496	.29	497	.29
Right Turn Adjustment					WBR	.01*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .73 .70

109 . Myford Rd. at Bryan Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	22	.01	54	.03
NBT	2	3400	37	.01*	142	.06*
NBR	0	0	10		55	
SBL	1	1700	118	.07*	39	.02*
SBT	2	3400	124	.06	59	.03
SBR	0	0	78		52	
EBL	1	1700	39	.02*	56	.03*
EBT	2	3400	392	.12	646	.19
EBR	d	1700	18	.01	45	.03
WBL	1	1700	88	.05	66	.04
WBT	2	3400	949	.28*	874	.26*
WBR	d	1700	53	.03	72	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .43 .42

110 . Myford Rd. at El Camino Real

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	0	.00
NBT	2	3400	0	.00*	0	.00*
NBR	0	0	0		0	
SBL	1	1700	72	.04*	119	.07*
SBT	1	1700	2	.00	4	.00
SBR	1	1700	150	.09	71	.04
EBL	1	1700	26	.02*	102	.06*
EBT	2	3400	308	.10	659	.20
EBR	0	0	16		10	
WBL	1	1700	6	.00	20	.01
WBT	2	3400	390	.12*	688	.24*
WBR	0	0	24		130	
Right Turn Adjustment			SBR	.03*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .26 .42

111 . Franklin Av. at Walnut Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	85	.05*	248	.15*
NBT	2	3400	10	.01	11	.01
NBR	0	0	18	.01	12	.01
SBL	1	1700	45	.03	63	.04
SBT	2	3400	13	.01*	11	.01*
SBR	0	0	159	.09	527	.31
EBL	1	1700	443	.26*	248	.15*
EBT	2	3400	947	.28	640	.19
EBR	d	1700	347	.20	140	.08
WBL	1	1700	70	.04	12	.01
WBT	2	3400	496	.15*	1508	.44*
WBR	d	1700	157	.09	68	.04
Right Turn Adjustment					SBR	.19*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.52		.99

445 . Tustin Ranch Rd. at Warner Av. N.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2.5	6800	254	{.06}	944	{.22}*
NBR	1.5		358		696	
SBL	2	3400	552	.16	344	.10*
SBT	3	5100	1293	.25*	446	.09
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2.5		647	.13*	314	.09*
WBT	0	6800	0		0	
WBR	1.5		286	{.03}	456	.13
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .43 .46

446 . Tustin Ranch Rd. at Warner Av. S.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	138	.04*	251	.07
NBT	3	5100	262	.05	719	.14*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	688	.13*	170	.03
SBR	2	3400	1252	.37	592	.17
EBL	2	3400	348	.10*	926	.27*
EBT	0	0	0		0	
EBR	1	1700	272	.16	352	.21
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			Multi	.19*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .51 .46

447 . Armstrong Av. at Valencia Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	48	.01*	103	.03*
NBT	1	1700	17	.01	105	.06
NBR	d	1700	7	.00	42	.02
SBL	1	1700	17	.01	17	.01
SBT	1	1700	116	.13*	49	.05*
SBR	0	0	113		44	
EBL	1	1700	29	.02*	71	.04*
EBT	2	3400	106	.03	261	.08
EBR	1	1700	79	.05	77	.05
WBL	2	3400	45	.01	25	.01
WBT	2	3400	380	.12*	213	.07*
WBR	0	0	15		24	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .33 .24

448 . Armstrong Av. at Warner Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	105	.03*	202	.06
NBT	2	3400	23	.01	80	.05*
NBR	0	0	22		82	.05
SBL	1	1700	21	.01	35	.02*
SBT	2	3400	50	.01*	40	.01
SBR	1	1700	99	.06	86	.05
EBL	1	1700	70	.04*	132	.08
EBT	3	5100	618	.12	1183	.23*
EBR	1	1700	163	.10	147	.09
WBL	1	1700	78	.05	43	.03*
WBT	3	5100	1332	.26*	832	.16
WBR	1	1700	27	.02	38	.02
Right Turn Adjustment			SBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .41 .38

453 . Red Hill Ave. at Valencia Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	118	.03*	176	.05
NBT	3	5100	473	.09	2115	.41*
NBR	1	1700	82	.05	140	.08
SBL	2	3400	51	.02	72	.02*
SBT	3	5100	1966	.39*	596	.12
SBR	1	1700	194	.11	48	.03
EBL	1	1700	17	.01*	145	.09*
EBT	2	3400	187	.06	341	.10
EBR	1	1700	21	.01	72	.04
WBL	2	3400	105	.03	81	.02
WBT	2	3400	472	.14*	324	.10*
WBR	1	1700	62	.04	98	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .67

454 . Tustin Ranch Rd. at Valencia Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	166	.05*	188	.06
NBT	3	5100	367	.07	1167	.23*
NBR	1	1700	7	.00	45	.03
SBL	2	3400	51	.02	105	.03*
SBT	3	5100	1706	.33*	683	.13
SBR	1	1700	303	.18	109	.06
EBL	2	3400	90	.03*	337	.10*
EBT	1	1700	3	.00	20	.01
EBR	1	1700	57	.03	84	.05
WBL	1	1700	67	.04	25	.01
WBT	2	3400	71	.02*	24	.01*
WBR	1	1700	52	.03	50	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .48 .42

455 . North Loop Rd. at Edinger Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05*	110	.06*
NBT	1	1700	1	.00	1	.00
NBR	1	1700	7	.00	10	.01
SBL	1	1700	1	.00	1	.00
SBT	1	1700	1	.00*	1	.00*
SBR	1	1700	1	.00	1	.00
EBL	1	1700	1	.00	1	.00
EBT	3	5100	153	.03*	3	.00*
EBR	0	0	0		0	
WBL	1	1700	120	.07*	120	.07*
WBT	3	5100	10	.00	90	.02
WBR	1	1700	1	.00	1	.00
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .20 .18

456 . North Loop Rd. at Valencia Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	132	.08*	53	.03*
NBT	1	1700	55	.03	76	.04
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	1	1700	104	.06*	84	.05*
SBR	1	1700	28	.02	27	.02
EBL	1	1700	5	.00	44	.03*
EBT	0	0	0		0	
EBR	1	1700	46	.03	96	.06
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					EBR	.01*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .19 .17

457 . North Loop Rd. at Moffett Dr.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	16	.00	29	.01*
NBR	1	1700	4	.00	65	.04
SBL	1	1700	26	.02	65	.04*
SBT	2	3400	54	.02*	29	.01
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	46	.03*	21	.01*
WBT	0	0	0		0	
WBR	1	1700	84	.05	21	.01
Right Turn Adjustment					NBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .10 .13

478 . Red Hill Ave. at I-5 NB Ramps

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	440	.26*	464	.27*
NBT	3	5100	872	.17	1075	.21
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1474	.29*	790	.15*
SBR	1	1700	588	.35	290	.17
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		346		363	
WBT	0.5	3400	2	.10*	38	.12*
WBR	1	1700	248	.15	409	.24
Right Turn Adjustment			SBR	.06*	SBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .61

479 . Red Hill Ave. at I-5 SB Ramps

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1041	.15*	1105	.16*
NBR	1	1700	611	.36	446	.26
SBL	1	1700	469	.28*	381	.22*
SBT	3	5100	1369	.27	769	.15
SBR	0	0	0		0	
EBL	0.5		251	{.15}*	449	{.26}*
EBT	0.5	1700	0	.15	0	.26
EBR	1	1700	519	.31	311	.18
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			Multi	.25*	NBR	.10*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .88 .79

480 . Tustin Ranch Rd. at Edinger Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01*	67	.04*
NBT	0	0	0		0	
NBR	1	1700	1	.00	1	.00
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	192	.04*	3	.00
EBR	1	1700	249	.15	245	.14
WBL	2	3400	15	.00	25	.01
WBT	3	5100	81	.02	193	.04*
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.10*	EBR	.08*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .20 .21

Source:V:\Recirculated Report\2015-FutureConditions\Traffic Model\CumulativeBaselineWProj\EXE-193\ICU\Y15WP-TUS02-102909

732 . Newport Av. at SR-55 NB Ramps

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	81	.02*	421	.12*
NBT	3	5100	329	.10	733	.16
NBR	0	0	212	.12	102	
SBL	1	1700	0	.00	41	.02
SBT	2	3400	886	.26*	325	.10*
SBR	1	1700	499	.29	1068	.63
EBL	2	3400	470	.14*	405	.12*
EBT	1.5	3400	365	.11	49	.03
EBR	0.5		24		39	
WBL	1	1700	30	.02	82	.05
WBT	2	3400	105	.04*	218	.08*
WBR	0	0	19		39	
Right Turn Adjustment					SBR	.44*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .51 .91

739 . Newport Av. at Mitchell Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	13	.01*	10	.01
NBT	3	5100	953	.23	1365	.30*
NBR	0	0	216		181	
SBL	1	1700	110	.06	200	.12*
SBT	3	5100	1922	.39*	1211	.27
SBR	0	0	67		141	
EBL	1	1700	131	.08*	96	.06*
EBT	1	1700	64	.05	39	.03
EBR	0	0	18		15	
WBL	1	1700	170	.10	184	.11
WBT	1	1700	49	.08*	69	.16*
WBR	0	0	86		198	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .69

740 . Red Hill Ave. at Mitchell Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	33	.02	176	.10
NBT	3	5100	1599	.33*	1298	.28*
NBR	0	0	81		111	
SBL	1	1700	276	.16*	119	.07*
SBT	3	5100	1188	.27	781	.17
SBR	0	0	192		103	
EBL	0.5		45		120	{.07}*
EBT	0.5	1700	32	.05*	100	.13
EBR	1	1700	13	.01	51	.03
WBL	0.5		16	{.01}*	18	
WBT	0.5	1700	19	.02	121	.08*
WBR	1	1700	74	.04	103	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .55

743 . Newport Avenue at Valencia Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	0	.00
NBT	1	1700	121	.07	502	.30*
NBR	d	1700	15	.01	46	.03
SBL	2	3400	560	.16	370	.11*
SBT	1	1700	670	.39*	266	.16
SBR	d	1700	0	.00	5	.00
EBL	1	1700	4	.00	5	.00
EBT	1	1700	5	.00*	4	.00*
EBR	d	1700	1	.00	8	.00
WBL	1	1700	70	.04*	43	.03*
WBT	1	1700	10	.01	5	.00
WBR	2	3400	474	.14	653	.19
Right Turn Adjustment					WBR	.08*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .48 .57

745 . Tustin Ranch Rd. at Park Ave.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	37	.01*	35	.01*
NBT	3	5100	151	.03	270	.05
NBR	1	1700	3	.00	4	.00
SBL	2	3400	30	.01	27	.01
SBT	3	5100	521	.10*	274	.05*
SBR	1	1700	396	.23	217	.13
EBL	2	3400	139	.04*	489	.14*
EBT	2	3400	27	.01	78	.02
EBR	1	1700	45	.03	82	.05
WBL	1	1700	37	.02	35	.02
WBT	1	1700	250	.15*	249	.15*
WBR	1	1700	113	.07	205	.12
Right Turn Adjustment			SBR	.10*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.45		.40

746 . Kensington Park at Edinger Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	23	.01*	64	.02*
NBT	0	0	0		0	
NBR	1	1700	17	.01	66	.04
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1503	.29	2384	.47*
EBR	1	1700	75	.04	29	.02
WBL	2	3400	95	.03	21	.01*
WBT	3	5100	2457	.48*	1646	.32
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.54		.56

747 . Kensington Park at Valencia Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	18	{.01}*	32	{.02}*
NBT	0	0	7		47	
NBR	0	0	15		101	
SBL	2	3400	27	.01	17	.01
SBT	0	0	72		8	
SBR	2	3400	31	.01	5	.00
EBL	2	3400	5	.00	15	.00
EBT	2	3400	97	.04	293	.09*
EBR	0	0	29		15	
WBL	0	0	100		37	{.02}*
WBT	2	3400	391	.14*	222	.08
WBR	1	1700	18	.01	38	.02
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.21		.18

748 . Armstrong Av. at A Street

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	103	.06*	109	.06
NBT	2	3400	94	.03	228	.07*
NBR	d	1700	54	.03	103	.06
SBL	1	1700	54	.03	58	.03*
SBT	2	3400	208	.06*	150	.04
SBR	d	1700	101	.06	62	.04
EBL	2	3400	34	.01*	98	.03
EBT	1	1700	181	.11	389	.23*
EBR	d	1700	77	.05	113	.07
WBL	1	1700	96	.06	87	.05*
WBT	1	1700	416	.24*	319	.19
WBR	d	1700	42	.02	74	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.42		.43

749 . Park Avenue at A Street

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	75	.02*	122	.04*
NBT	1	1700	25	.01	38	.02
NBR	d	1700	50	.03	199	.12
SBL	1	1700	2	.00	8	.00
SBT	1	1700	14	.01*	17	.01*
SBR	d	1700	4	.00	5	.00
EBL	1	1700	10	.01	11	.01
EBT	2	3400	168	.05*	447	.13*
EBR	d	1700	113	.07	103	.06
WBL	1	1700	203	.12*	142	.08*
WBT	2	3400	471	.14	356	.10
WBR	d	1700	15	.01	11	.01
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .25 .32

750 . Legacy Road at Warner Avenue

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	0	.00
NBT	2	3400	0	.00*	0	.00*
NBR	1	1700	0	.00	0	.00
SBL	1	1700	9	.01*	18	.01*
SBT	2	3400	2	.00	2	.00
SBR	1	1700	43	.03	66	.04
EBL	2	3400	52	.02*	68	.02
EBT	3	5100	551	.11	1169	.23*
EBR	1	1700	1	.00	1	.00
WBL	2	3400	2	.00	2	.00
WBT	3	5100	1377	.27*	845	.17
WBR	1	1700	28	.02	14	.01
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .35 .29

751 . Tustin Ranch Rd. at Legacy Road

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	18	.01*	22	.01
NBT	3	5100	514	.10	1320	.26*
NBR	1	1700	22	.01	41	.02
SBL	2	3400	33	.01	41	.01*
SBT	3	5100	1756	.34*	734	.14
SBR	1	1700	27	.02	21	.01
EBL	1	1700	10	.01	26	.02*
EBT	2	3400	5	.00*	8	.00
EBR	1	1700	25	.01	17	.01
WBL	1	1700	39	.02*	29	.02
WBT	2	3400	5	.00	7	.00*
WBR	1	1700	16	.01	44	.03
Right Turn Adjustment					WBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .42 .36

752 . Legacy Road at North Loop Road

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	35	.02*	15	.01*
NBT	2	3400	21	.01	11	.00
NBR	d	1700	4	.00	4	.00
SBL	1	1700	3	.00	7	.00
SBT	2	3400	4	.00*	20	.01*
SBR	d	1700	23	.01	24	.01
EBL	1	1700	13	.01*	24	.01
EBT	1	1700	23	.01	79	.05*
EBR	1	1700	4	.00	26	.02
WBL	1	1700	2	.00	5	.00
WBT	1	1700	92	.05*	51	.03
WBR	d	1700	6	.00	4	.00
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .13 .12

753 . Tustin Ranch Rd. at Edinger Av.

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	547	.11	1564	.31*
NBR	1	1700	2	.00	28	.02
SBL	1	1700	18	.01	32	.02*
SBT	3	5100	1980	.39*	825	.16
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	80	.02*	85	.03*
WBT	0	0	0		0	
WBR	1	1700	193	.11	186	.11
Right Turn Adjustment					WBR	.06*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.46		.47

754 . Red Hill Ave. at Carnegie

Y2015 WITH Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	107	.06*	24	.01
NBT	3	5100	547	.11	2119	.42*
NBR	1	1700	93	.05	135	.08
SBL	2	3400	133	.04	99	.03*
SBT	3	5100	1298	.25*	749	.15
SBR	d	1700	118	.07	11	.01
EBL	1	1700	7	.00	122	.07
EBT	1	1700	121	.07	346	.20*
EBR	1	1700	8	.00	59	.03
WBL	1	1700	61	.04	75	.04*
WBT	0.5	3400	425	.25*	209	{.12}
WBR	1.5		91		225	{.11}
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.61		.74

Appendix B-5 **Post-2030 Cumulative Baseline No Project ICU Worksheets**

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\noProj\EXE-193\ICU\P30NP-C-COM01-102809

10 . SR-55 Frontage Rd. SB at Paularino Av.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	796		172	
SBT	2	3200	956	.55*	709	.28*
SBR	1	1600	187	.12	308	.19
EBL	0	0	0		0	
EBT	2	3200	1114	.40*	518	.20*
EBR	0	0	167		106	
WBL	1	1600	117	.07*	285	.18*
WBT	2	3200	223	.07	842	.26
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION 1.02 .66

11 . SR-55 Frontage Rd. NB at Paularino Av.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	118		158	
NBT	2	3200	743	.27*	884	.33*
NBR	d	1600	277	.17	202	.13
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	1	1600	271	.17	169	.11*
EBT	2	3200	1643	.51*	558	.17
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	222	.07	962	.30*
WBR	1	1600	256	.16	627	.39
Right Turn Adjustment					WBR	.09*

TOTAL CAPACITY UTILIZATION .78 .83

12 . SR-55 Frontage Rd. SB at Baker St.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	826	{.52}*	271	
SBT	2	3200	150	.31	368	.20*
SBR	1	1600	214	.13	501	.31
EBL	0	0	0		0	
EBT	1.5	4800	1924	.60*	799	.28*
EBR	1.5		262	.16	532	
WBL	1	1600	98	.06*	349	.22*
WBT	2	3200	486	.15	1389	.43
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.06*

TOTAL CAPACITY UTILIZATION 1.18 .76

13 . SR-55 Frontage Rd. NB at Baker St.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		394	.25	367	.23
NBT	1.5	4800	420	.26*	444	.28*
NBR	0		606	.38	490	.31
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	680	.21	321	.10*
EBT	2	3200	2029	.63*	670	.21
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	268	.08	1413	.44*
WBR	1	1600	181	.11	635	.40
Right Turn Adjustment			NBR	.12*		

TOTAL CAPACITY UTILIZATION 1.01 .82

50 . Red Hill Av. at Paularino Av.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	57	.02*	261	.08*
NBT	2	3200	260	.10	805	.26
NBR	0	0	62		43	
SBL	1	1600	64	.04	15	.01
SBT	2	3200	440	.15*	936	.39*
SBR	0	0	47		320	
EBL	1	1600	125	.08	229	.14*
EBT	2	3200	1338	.48*	218	.10
EBR	0	0	200		102	
WBL	1	1600	82	.05*	109	.07
WBT	2	3200	397	.14	680	.23*
WBR	0	0	36		71	

TOTAL CAPACITY UTILIZATION .70 .84

51 . Red Hill Av. at Baker St.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	190	.06	650	.20*
NBT	2	3200	897	.31*	742	.24
NBR	0	0	92		20	
SBL	1	1600	16	.01*	7	.00
SBT	2	3200	431	.15	783	.36*
SBR	0	0	43		384	
EBL	1.5		661	{.24}*	498	.16*
EBT	1.5	4800	492	.24	173	.11
EBR	1	1600	758	.47	191	.12
WBL	1	1600	11	.01	106	.07
WBT	2	3200	46	.02*	405	.14*
WBR	0	0	13		30	
Right Turn Adjustment			EBR	.09*		

TOTAL CAPACITY UTILIZATION .67 .86

52 . Red Hill Av. at Bristol St.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	122	.04	74	.02
NBT	1.5	4800	527	.16*	183	.06*
NBR	1.5		78	.05	23	
SBL	2	3200	237	.07*	600	.19*
SBT	2	3200	148	.05	621	.19
SBR	1	1600	26	.02	339	.21
EBL	2	3200	342	.11*	168	.05*
EBT	3	4800	776	.16	621	.13
EBR	1	1600	61	.04	91	.06
WBL	2	3200	81	.03	117	.04
WBT	3	4800	482	.10*	1080	.23*
WBR	1	1600	711	.44	343	.21
Right Turn Adjustment			WBR	.29*		

TOTAL CAPACITY UTILIZATION .73 .53

541 . Bear St. at Baker St.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	59	.04	217	.14*
NBT	1	1600	141	.13*	257	.19
NBR	0	0	59		46	
SBL	2	3200	495	.15*	261	.08
SBT	1	1600	242	.15	225	.14*
SBR	2	3200	263	.08	486	.15
EBL	2	3200	437	.14	280	.09*
EBT	2	3200	1260	.44*	737	.27
EBR	0	0	162		116	
WBL	1	1600	67	.04*	70	.04
WBT	3	4800	340	.07	1511	.31*
WBR	1	1600	142	.09	185	.12

TOTAL CAPACITY UTILIZATION .76 .68

542 . Bear St. at Paularino Av.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	100	.06	26	.02
NBT	3	4800	1198	.26*	1863	.42*
NBR	0	0	27		166	
SBL	1	1600	138	.09*	170	.11*
SBT	3	4800	984	.27	1132	.24
SBR	0	0	300		33	
EBL	1	1600	150	.09*	25	.02
EBT	1	1600	26	.04	6	.03*
EBR	0	0	36		38	
WBL	1	1600	7	.00	137	.09*
WBT	1	1600	22	.01*	21	.01
WBR	1	1600	71	.04	233	.15
TOTAL CAPACITY UTILIZATION				.45		.65

545 . Bristol St. at Sunflower Av.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	3	4800	198	.04	607	.13
NBT	2.5	6400	999	.21*	1850	.39*
NBR	1.5		356	{.16}	193	.12
SBL	2	3200	309	.10*	176	.06*
SBT	3	4800	1241	.26	1069	.22
SBR	1	1600	143	.09	264	.17
EBL	2	3200	122	.04	346	.11
EBT	2.5	6400	1245	.28*	1141	.24*
EBR	1.5		576		393	{.07}
WBL	2	3200	253	.08*	307	.10*
WBT	4	6400	289	.05	569	.09
WBR	d	1600	199	.12	344	.22
TOTAL CAPACITY UTILIZATION				.67		.79

546 . Bristol St. at Anton Blvd.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	79	.02	487	.15
NBT	4	6400	1228	.19*	2182	.34*
NBR	f		1249		750	
SBL	2	3200	271	.08*	252	.08*
SBT	4	6400	1523	.24	1425	.22
SBR	1	1600	21	.01	53	.03
EBL	1	1600	20	.01	94	.06
EBT	1	1600	56	.04*	79	.05*
EBR	1	1600	15	.01	178	.11
WBL	3	4800	561	.12*	1137	.24*
WBT	1	1600	30	.02	120	.08
WBR	1	1600	178	.11	354	.22
TOTAL CAPACITY UTILIZATION				.43		.71

547 . Bristol St. at Paularino Av.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	27	.01	102	.03*
NBT	4	6400	1155	.20*	1522	.26
NBR	0	0	105		113	
SBL	2	3200	564	.18*	345	.11
SBT	3	4800	1148	.24	1748	.39*
SBR	0	0	27		107	
EBL	1	1600	226	.14	136	.09*
EBT	1	1600	391	.24*	172	.11
EBR	1	1600	25	.02	42	.03
WBL	2	3200	57	.02*	200	.06
WBT	1	1600	135	.08	541	.34*
WBR	1	1600	219	.14	462	.29
TOTAL CAPACITY UTILIZATION				.64		.85

548 . Bristol St. at Baker St.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	72	.02	144	.05
NBT	4	6400	498	.08*	902	.14*
NBR	1	1600	207	.13	171	.11
SBL	2	3200	484	.15*	451	.14*
SBT	3	4800	614	.13	864	.18
SBR	1	1600	182	.11	594	.37
EBL	3	4800	377	.08	302	.06*
EBT	3	4800	1399	.31*	588	.14
EBR	0	0	70		75	
WBL	2	3200	116	.04*	251	.08
WBT	3	4800	296	.06	1042	.22*
WBR	1	1600	315	.20	657	.41
Right Turn Adjustment			NBR	.02*	Multi	.17*
TOTAL CAPACITY UTILIZATION				.60		.73

549 . Bristol St. at Newport Blvd. SB

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	189	.06*	610	.19*
NBT	3	4800	900	.19	1290	.27
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	890	.19*	650	.14*
SBR	d	1600	271	.17	500	.31
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.17*
TOTAL CAPACITY UTILIZATION				.25		.50

550 . Bristol St. at Newport Blvd. NB

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	644	.13	1359	.28*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	815	.17*	681	.14
SBR	0	0	0		0	
EBL	1.5		416	{.15}*	377	.12*
EBT	0	4800	0	.15	0	
EBR	1.5		285		203	{.02}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
TOTAL CAPACITY UTILIZATION				.32		.40

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\noProj\EXE-193\ICU\P30NP-C-COM02-102809

715 . Bristol St. at I-405 NB Ramps

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6400	1994	.31*	2363	.37*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	5	8000	2174	.27	2449	.31
SBR	0	0	21		65	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	2	3200	50	.02	304	.10
WBL	1.5		105		220	
WBT	1.5	4800	69	.04*	306	.11*
WBR	2	3200	566	.18	822	.26
Right Turn Adjustment			WBR	.14*	Multi	.20*

TOTAL CAPACITY UTILIZATION .49 .68

716 . Bristol St. at I-405 SB Ramps

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	180	.11*	254	.16*
NBT	4	6400	1488	.23	2552	.40
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	1371	.29*	1917	.40*
SBR	f		912		1238	
EBL	3	4800	696	.15*	633	.13*
EBT	0	0	0		0	
EBR	1	1600	623	.39	206	.13
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.16*		

TOTAL CAPACITY UTILIZATION .71 .69

717 . Bear St. at SR-73 SB Ramps

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3200	388	.24*	958	.37*
NBR	0	0	462	.29	235	
SBL	2	3200	698	.22*	1175	.37*
SBT	2	3200	602	.19	1231	.38
SBR	0	0	0		0	
EBL	1.5		162	.10*	272	{.14}*
EBT	0	3200	0		0	.14
EBR	0.5		368	.23	189	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .56 .88

718 . Bear St. at SR-73 NB Ramps

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	98	.03*	315	.10*
NBT	2	3200	404	.13	715	.22
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	1043	.24*	1321	.34*
SBR	0	0	132		305	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	167	.10*	279	.17*
WBT	0	0	0		0	
WBR	2	3200	766	.24	1255	.39
Right Turn Adjustment			WBR	.03*	WBR	.05*

TOTAL CAPACITY UTILIZATION .40 .66

721 . Flower St. at Sunflower Av.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	53	.03*	64	.04*
NBT	2	3200	208	.07	549	.17
NBR	1	1600	88	.06	86	.05
SBL	1	1600	160	.10	66	.04
SBT	2	3200	416	.17*	351	.18*
SBR	0	0	114		233	
EBL	2	3200	100	.03	239	.07*
EBT	3	4800	806	.19*	598	.15
EBR	0	0	83		113	
WBL	2	3200	93	.03*	106	.03
WBT	3	4800	284	.07	1092	.25*
WBR	0	0	62		92	

TOTAL CAPACITY UTILIZATION .42 .54

722 . Anton Blvd. at Sunflower Av.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	25	.02*	19	.01*
NBT	0	0	0		0	
NBR	2	3200	372	.12	559	.17
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	1125	.25*	671	.15*
EBR	0	0	61		42	
WBL	2	3200	310	.10*	438	.14*
WBT	3	4800	417	.09	1411	.29
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.02*	NBR	.05*

TOTAL CAPACITY UTILIZATION .39 .35

726 . Main St. at Sunflower Av.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	406	.13*	1222	.38*
NBT	3	4800	304	.06	1088	.23
NBR	0	0	3		1	
SBL	1	1600	9	.01	1	.00
SBT	2	3200	732	.23*	438	.14*
SBR	1	1600	238	.15	532	.33
EBL	1.5		471	{.15}*	475	{.15}*
EBT	0.5	3200	0	.15	0	.15
EBR	2	3200	1060	.33	624	.20
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.08*	SBR	.08*

TOTAL CAPACITY UTILIZATION .59 .75

735 . Newport Blvd. NB at Del Mar Av./University Dr.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	133		170	
NBT	3	4800	1117	.26*	652	.17*
NBR	1	1600	201	.13	187	.12
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	778	.24*	448	.14*
EBT	2	3200	702	.22	683	.21
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1.5	4800	348	.16*	590	.19*
WBR	1.5		441		300	

TOTAL CAPACITY UTILIZATION .66 .50

736 . Newport Blvd. SB at Del Mar Av./University

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	162	.10	298	.19
SBT	3	4800	461	.10*	1397	.29*
SBR	f		498		1185	
EBL	0	0	0		0	
EBT	4	6400	1238	.20*	792	.13*
EBR	0	0	42		58	
WBL	1	1600	168	.11*	155	.10*
WBT	2	3200	332	.10	605	.19
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .41 .52

737 . Newport Blvd. NB at Mesa Dr.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	17	.01	22	.01
NBT	2	3200	470	.19*	367	.14*
NBR	0	0	135		79	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	90	.03	77	.02
EBT	1	1600	155	.10*	281	.18*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1600	63	.06	225	.16
WBR	0	0	40		29	

TOTAL CAPACITY UTILIZATION .29 .32

738 . Newport Blvd. SB at Mesa Dr.

P2030 Constraint No Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	240	.15	380	.24
SBT	4	6400	1099	.17*	2760	.43*
SBR	1	1600	0	.00	0	.00
EBL	0	0	0		0	
EBT	1	1600	0	.00*	0	.00*
EBR	1	1600	0	.00	0	.00
WBL	1	1600	80	.05*	270	.17*
WBT	1	1600	0	.00	0	.00
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .22 .60

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\noProj\EXE-193\ICU\P30NP-C-IRV01-102809

42 . Red Hill Av. at Barranca Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	265	.08*	780	.23
NBT	4	6800	557	.08	1900	.28*
NBR	d	1700	78	.05	200	.12
SBL	2	3400	414	.12	367	.11*
SBT	4	6800	1128	.17*	624	.09
SBR	d	1700	208	.12	187	.11
EBL	2	3400	349	.10	253	.07*
EBT	4	6800	1291	.25*	843	.15
EBR	0	0	389		195	
WBL	2	3400	329	.10*	150	.04
WBT	4	6800	708	.10	922	.14*
WBR	1	1700	255	.15	537	.32
Right Turn Adjustment					WBR	.10*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .75

43 . Red Hill Av. at Deere Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	115	.07*	47	.03
NBT	3	5100	857	.17	2577	.51*
NBR	d	1700	77	.05	30	.02
SBL	1	1700	62	.04	25	.01*
SBT	3	5100	1540	.30*	1000	.20
SBR	d	1700	107	.06	19	.01
EBL	1	1700	14	.01	93	.05
EBT	1	1700	41	.05*	75	.11*
EBR	0	0	46		112	
WBL	1	1700	14	.01*	69	.04*
WBT	1	1700	17	.01	64	.04
WBR	1	1700	29	.02	195	.11
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .48 .72

44 . Red Hill Av. at Alton Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	124	.07	34	.02
NBT	3	5100	915	.25*	2170	.49*
NBR	0	0	368		330	
SBL	1	1700	198	.12*	175	.10*
SBT	3	5100	1383	.27	1013	.20
SBR	d	1700	78	.05	17	.01
EBL	1	1700	8	.00	37	.02
EBT	2	3400	44	.01*	186	.05*
EBR	1	1700	40	.02	108	.06
WBL	2	3400	367	.11*	514	.15*
WBT	1	1700	148	.09	112	.07
WBR	1	1700	78	.05	525	.31
Right Turn Adjustment					WBR	.05*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .89

45 . Red Hill Av. at McGaw Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	495	.15*	135	.04
NBT	3	5100	1316	.26	2105	.41*
NBR	1	1700	328	.19	169	.10
SBL	2	3400	250	.07	77	.02*
SBT	3	5100	1429	.28*	1585	.31
SBR	d	1700	52	.03	69	.04
EBL	1	1700	16	.01	90	.05
EBT	2	3400	31	.02*	114	.07*
EBR	0	0	93	.05	336	.20
WBL	2	3400	228	.07*	299	.09*
WBT	2	3400	84	.05	56	.03
WBR	0	0	69		245	.14
Right Turn Adjustment					Multi	.05*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .69

47 . Red Hill Av. at MacArthur Blvd.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	89	.05	414	.24*
NBT	3	5100	942	.19*	1094	.23
NBR	0	0	49		81	
SBL	2	3400	339	.10*	497	.15
SBT	3	5100	1042	.20	830	.16*
SBR	f		399		1143	
EBL	2	3400	1076	.32*	726	.21*
EBT	3	5100	665	.13	302	.06
EBR	d	1700	179	.11	162	.10
WBL	1	1700	74	.04	97	.06
WBT	3	5100	404	.08*	833	.16*
WBR	f		591		750	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .82

48 . Red Hill Av. at Sky Park N

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	33	.02	31	.02
NBT	3	5100	960	.19*	1263	.25*
NBR	d	1700	78	.05	41	.02
SBL	1	1700	158	.09*	90	.05*
SBT	3	5100	952	.19	952	.19
SBR	d	1700	128	.08	50	.03
EBL	1	1700	22	.01*	69	.04*
EBT	1	1700	27	.02	30	.02
EBR	1	1700	20	.01	42	.02
WBL	1	1700	19	.01	105	.06
WBT	1	1700	21	.07*	78	.19*
WBR	0	0	100		248	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .41 .58

49 . Red Hill Av. at Main St.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	246	.07	449	.13
NBT	2	3400	834	.25*	980	.29*
NBR	1	1700	356	.21	274	.16
SBL	2	3400	145	.04*	196	.06*
SBT	2	3400	599	.18	708	.21
SBR	f		200		462	
EBL	2	3400	296	.09	290	.09
EBT	3	5100	1419	.35*	1170	.31*
EBR	0	0	343		425	
WBL	2	3400	149	.04*	357	.11*
WBT	3	5100	474	.11	1429	.31
WBR	0	0	100		130	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .73 .82

70 . Gillette Av. at Main St.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	60	.02*	284	.08
NBT	1	1700	5	.00	26	.02*
NBR	1	1700	35	.02	480	.28
SBL	2	3400	32	.01	248	.07*
SBT	1	1700	22	.01*	17	.01
SBR	d	1700	36	.02	265	.16
EBL	2	3400	324	.10*	95	.03*
EBT	4	6800	1086	.16	1297	.19
EBR	f		340		78	
WBL	2	3400	240	.07	65	.02
WBT	3	5100	817	.20*	1006	.20*
WBR	0	0	214		29	
Right Turn Adjustment					Multi	.36*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .38 .73

71 . Armstrong St. at Barranca Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	37	.02*	229	.13*
NBT	1	1700	41	.02	214	.13
NBR	1	1700	52	.03	228	.13
SBL	1	1700	104	.06	112	.07
SBT	1	1700	120	.07*	118	.07*
SBR	1	1700	76	.04	111	.07
EBL	1	1700	92	.05	109	.06*
EBT	4	6800	1111	.16*	1047	.15
EBR	d	1700	142	.08	115	.07
WBL	1	1700	241	.14*	129	.08
WBT	4	6800	1415	.23	1109	.18*
WBR	0	0	159		122	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .44 .49

77 . MacArthur Bl. at Sky Park E.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	110	.06*	89	.05
NBT	3	5100	939	.18	1590	.31*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6800	1061	.18*	799	.13
SBR	0	0	150		61	
EBL	2	3400	31	.01*	166	.05*
EBT	0	0	0		0	
EBR	1	1700	69	.04	255	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .30 .41

78 . MacArthur Bl. at Main St.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	785	.23*	702	.21*
NBT	4	6800	735	.11	1157	.17
NBR	f		1314		482	
SBL	2	3400	411	.12	220	.06
SBT	4	6800	694	.10*	993	.15*
SBR	1	1700	98	.06	87	.05
EBL	1	1700	83	.05	87	.05
EBT	3	5100	695	.14*	650	.13*
EBR	1	1700	444	.26	703	.41
WBL	2	3400	262	.08*	647	.19*
WBT	3	5100	427	.08	664	.13
WBR	f		142		559	
Right Turn Adjustment					EBR	.07*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .60 .80

79 . MacArthur Bl. at I-405 NB Ramps

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	2087	.31*	1957	.29*
NBR	2	3400	219	.06	908	.27
SBL	2	3400	221	.07*	622	.18*
SBT	4	6800	1331	.20	1735	.26
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	929	.27*	595	.18*
WBT	0	0	0		0	
WBR	2	3400	723	.21	313	.09
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .70 .70

80 . MacArthur Bl. at I-405 SB Ramps

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1144	.17*	2186	.32*
NBR	1	1700	353	.21	696	.41
SBL	2	3400	234	.07*	606	.18*
SBT	4	6800	1410	.21	1344	.20
SBR	1	1700	590	.35	448	.26
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	997	.29*	649	.19
WBT	1	1700	290	.17	323	.19*
WBR	f		1112		598	
Right Turn Adjustment			SBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .74

82 . MacArthur Bl. at Michelson Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	294	.17*	164	.10
NBT	4	6800	1180	.17	1668	.25*
NBR	1	1700	285	.17	110	.06
SBL	2	3400	375	.11	725	.21*
SBT	4	6800	2063	.30*	1853	.27
SBR	0	0	0		0	
EBL	2	3400	265	.08*	459	.14
EBT	2	3400	190	.07	195	.09*
EBR	0	0	56		116	
WBL	2	3400	80	.02	482	.14*
WBT	1	1700	86	.05*	96	.06
WBR	1	1700	145	.09	702	.41
Right Turn Adjustment					WBR	.11*
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for WBR						

TOTAL CAPACITY UTILIZATION .65 .85

83 . MacArthur Bl. at Douglas Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1628	.25*	1655	.25
NBR	0	0	38		31	
SBL	2	3400	272	.08*	149	.04
SBT	4	6800	1772	.26	2234	.33*
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	18	.01*	26	.02*
WBT	0	0	0		0	
WBR	1	1700	92	.05	185	.11
Right Turn Adjustment					WBR	.03*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .39 .43

87 . Dupont Dr. at Michelson Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	66	.04*	203	.12*
NBT	2	3400	38	.02	32	.02
NBR	0	0	27		64	.04
SBL	1	1700	16	.01	87	.05
SBT	2	3400	10	.01*	33	.02*
SBR	0	0	14	.01	100	.06
EBL	1	1700	70	.04	48	.03*
EBT	2	3400	656	.28*	509	.17
EBR	0	0	279		54	
WBL	1	1700	21	.01*	23	.01
WBT	3	5100	250	.07	907	.19*
WBR	0	0	82		50	
Right Turn Adjustment					SBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .39 .43

97 . Von Karman Av. at Barranca Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	170	.05*	429	.13*
NBT	2	3400	227	.07	380	.11
NBR	d	1700	193	.11	671	.39
SBL	2	3400	126	.04	250	.07
SBT	2	3400	475	.14*	432	.13*
SBR	2	3400	108	.03	159	.05
EBL	2	3400	82	.02	62	.02
EBT	3	5100	663	.13*	1022	.20*
EBR	1	1700	276	.16	196	.12
WBL	2	3400	602	.18*	238	.07*
WBT	4	6800	1254	.18	782	.12
WBR	1	1700	192	.11	81	.05
Right Turn Adjustment					NBR	.15*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .73

98 . Von Karman Av. at Alton Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	68	.04*	156	.09
NBT	2	3400	498	.15	1146	.34*
NBR	d	1700	70	.04	404	.24
SBL	1	1700	55	.03	286	.17*
SBT	2	3400	1021	.30*	501	.15
SBR	d	1700	42	.02	104	.06
EBL	1	1700	54	.03*	62	.04
EBT	2	3400	325	.10	890	.26*
EBR	d	1700	64	.04	100	.06
WBL	1	1700	325	.19	119	.07*
WBT	2	3400	930	.27*	550	.16
WBR	d	1700	218	.13	123	.07
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .89

99 . Von Karman Av. at McGaw Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	51	.03*	31	.02
NBT	2	3400	522	.15	1928	.57*
NBR	d	1700	44	.03	114	.07
SBL	1	1700	55	.03	54	.03*
SBT	2	3400	1256	.37*	619	.18
SBR	d	1700	40	.02	33	.02
EBL	1	1700	19	.01	86	.05
EBT	2	3400	171	.07*	422	.14*
EBR	0	0	51		63	
WBL	1	1700	163	.10*	28	.02*
WBT	2	3400	338	.12	166	.08
WBR	0	0	59		107	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .81

100 . Von Karman Av. at Main St.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	120	.04*	275	.08
NBT	2	3400	393	.12	1075	.32*
NBR	1	1700	97	.06	249	.15
SBL	1	1700	105	.06	162	.10*
SBT	2	3400	1139	.34*	643	.19
SBR	1	1700	275	.16	184	.11
EBL	2	3400	315	.09*	548	.16
EBT	3	5100	609	.12	1482	.29*
EBR	f		287		161	
WBL	2	3400	278	.08	127	.04*
WBT	3	5100	868	.19*	663	.15
WBR	0	0	104		110	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .71 .80

101 . Von Karman Av. at Morse Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	247	.07*	70	.02
NBT	2	3400	571	.20	1337	.40*
NBR	0	0	105		11	
SBL	1	1700	138	.08	28	.02*
SBT	2	3400	1126	.33*	855	.25
SBR	f		143		29	
EBL	1	1700	12	.01*	54	.03*
EBT	1	1700	8	.00	2	.00
EBR	f		49		245	
WBL	1	1700	10	.01	90	.05
WBT	1	1700	2	.02*	10	.10*
WBR	0	0	38		160	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .48 .60

102 . Von Karman Av. at Michelson Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	48	.03	63	.04*
NBT	2	3400	919	.27*	975	.29
NBR	1	1700	87	.05	103	.06
SBL	1	1700	174	.10*	265	.16
SBT	2	3400	699	.24	1392	.46*
SBR	0	0	110		182	
EBL	2	3400	166	.05	202	.06
EBT	2	3400	209	.08*	502	.18*
EBR	0	0	46		96	
WBL	1	1700	185	.11*	172	.10*
WBT	2	3400	362	.11	595	.18
WBR	f		355		333	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .83

103 . Von Karman Av. at Dupont Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	86	.05	41	.02*
NBT	2	3400	1017	.31*	1083	.34
NBR	0	0	23		86	
SBL	1	1700	47	.03*	70	.04
SBT	2	3400	781	.23	1368	.40*
SBR	1	1700	37	.02	21	.01
EBL	1	1700	5	.00	16	.01
EBT	2	3400	50	.03*	124	.07*
EBR	0	0	65	.04	140	.08
WBL	1	1700	75	.04*	56	.03*
WBT	2	3400	107	.05	99	.06
WBR	0	0	68		104	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .46 .57

104 . Von Karman Av. at Martin

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	24	.01*
NBT	2	3400	979	.29*	1027	.30
NBR	1	1700	16	.01	36	.02
SBL	1	1700	22	.01*	31	.02
SBT	2	3400	724	.26	1377	.45*
SBR	0	0	159		145	
EBL	2	3400	95	.03*	161	.05*
EBT	1	1700	2	.02	3	.03
EBR	0	0	33		46	
WBL	1	1700	3	.00	27	.02
WBT	1	1700	1	.00*	11	.04*
WBR	0	0	6		52	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .38 .60

112 . Myford Rd. at Michelle Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	55	.03*	44	.03
NBT	2	3400	75	.04	362	.18*
NBR	0	0	61		245	
SBL	1	1700	127	.07	123	.07*
SBT	2	3400	287	.12*	93	.03
SBR	0	0	111		25	
EBL	1	1700	10	.01*	63	.04
EBT	2	3400	72	.02	376	.11*
EBR	d	1700	19	.01	32	.02
WBL	1	1700	85	.05	52	.03*
WBT	2	3400	294	.10*	118	.06
WBR	0	0	45		102	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .31 .44

113 . Myford Rd. at Walnut Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01*	117	.07
NBT	1	1700	6	.00	122	.07*
NBR	f		65		284	
SBL	2	3400	97	.03	153	.05*
SBT	1	1700	34	.02*	13	.01
SBR	1	1700	245	.14	156	.09
EBL	1	1700	79	.05	80	.05*
EBT	2	3400	878	.26*	814	.24
EBR	d	1700	58	.03	11	.01
WBL	2	3400	328	.10*	36	.01
WBT	2	3400	855	.25	1066	.31*
WBR	1	1700	145	.09	118	.07
Right Turn Adjustment			SBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .48 .53

114 . Millikan Av. at Barranca Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04*	33	.02
NBT	2	3400	23	.01	20	.01*
NBR	d	1700	58	.03	433	.25
SBL	2	3400	59	.02	290	.09*
SBT	0.5	3400	30	.02*	35	.02
SBR	1.5		31	{.01}	26	
EBL	2	3400	36	.01*	27	.01
EBT	3	5100	671	.13	1648	.32*
EBR	d	1700	169	.10	45	.03
WBL	1	1700	189	.11	66	.04*
WBT	4	6800	1682	.25*	844	.12
WBR	1	1700	183	.11	582	.34
Right Turn Adjustment					NBR	.21*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .37 .72

115 . Millikan Av. at Alton Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	2	.00	2	.00
NBT	1	1700	2	.00*	2	.00*
NBR	1	1700	6	.00	6	.00
SBL	1	1700	58	.03*	127	.07*
SBT	1	1700	3	.00	2	.00
SBR	1	1700	80	.05	120	.07
EBL	1	1700	79	.05*	162	.10
EBT	2	3400	355	.10	1097	.32*
EBR	d	1700	4	.00	2	.00
WBL	1	1700	24	.01	6	.00
WBT	2	3400	988	.29*	578	.17
WBR	d	1700	190	.11	116	.07
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .42 .44

116 . Cartwright Rd. at Main St.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	25	.01*	82	.05*
NBT	1	1700	1	.00	2	.00
NBR	1	1700	24	.01	215	.13
SBL	2	3400	7	.00	88	.03
SBT	1	1700	3	.01*	3	.04*
SBR	0	0	19		59	
EBL	1	1700	56	.03*	20	.01
EBT	3	5100	571	.13	1820	.36*
EBR	0	0	95		27	
WBL	2	3400	173	.05	40	.01*
WBT	3	5100	1261	.25*	1055	.21
WBR	0	0	63		8	
Right Turn Adjustment					NBR	.06*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .36 .57

119 . Teller Av. at Michelson Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	27	.02*	65	.04*
NBT	1	1700	2	.00	0	.00
NBR	1	1700	32	.02	478	.28
SBL	1	1700	13	.01	13	.01
SBT	1	1700	3	.00*	3	.00*
SBR	1	1700	5	.00	4	.00
EBL	1	1700	4	.00	5	.00
EBT	3	5100	365	.07*	1115	.22*
EBR	1	1700	75	.04	170	.10
WBL	1	1700	592	.35*	78	.05*
WBT	3	5100	1529	.30	744	.15
WBR	1	1700	34	.02	5	.00
Right Turn Adjustment					NBR	.21*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .49 .57

126 . Jamboree Rd. at Bryan Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	115	.03*	270	.08
NBT	4	6800	691	.10	2038	.30*
NBR	1	1700	177	.10	440	.26
SBL	2	3400	349	.10	86	.03*
SBT	4	6800	2354	.35*	969	.14
SBR	d	1700	130	.08	204	.12
EBL	2	3400	66	.02	233	.07
EBT	2	3400	434	.13*	553	.16*
EBR	d	1700	202	.12	116	.07
WBL	2	3400	554	.16*	345	.10*
WBT	2	3400	565	.17	596	.18
WBR	1	1700	283	.17	240	.14
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .64

127 . Jamboree Rd. at El Camino Real

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	276	.08*	463	.14
NBT	4	6800	802	.12	1748	.26*
NBR	1	1700	583	.34	310	.18
SBL	1	1700	216	.13	124	.07*
SBT	4	6800	2543	.37*	978	.14
SBR	1	1700	161	.09	198	.12
EBL	1	1700	82	.05	217	.13
EBT	1	1700	155	.09*	196	.12*
EBR	2	3400	193	.06	327	.10
WBL	2	3400	365	.11*	735	.22*
WBT	2	3400	85	.05	259	.14
WBR	0	0	68		205	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .70 .72

128 . Jamboree Rd. at I-5 NB Ramps

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1320	.19	2634	.39*
NBR	f		670		710	
SBL	0	0	0		0	
SBT	4	6800	1878	.28*	1750	.26
SBR	f		470		480	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		1172	.34*	430	.25*
WBT	0	5100	0		0	
WBR	1.5		510	.30	986	.29
Right Turn Adjustment					WBR	.04*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .73

129 . Jamboree Rd. at I-5 SB Ramps

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1531	.23	2598	.38*
NBR	f		430		1142	
SBL	0	0	0		0	
SBT	4	6800	2286	.34*	1671	.25
SBR	f		604		501	
EBL	2	3400	457	.13*	677	.20*
EBT	0	0	0		0	
EBR	2	3400	972	.29	752	.22
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.16*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .63

130 . Jamboree Rd. at Michelle Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	307	.18*	251	.15*
NBT	4	6800	1451	.21	3053	.45
NBR	d	1700	0	.00	0	.00
SBL	1	1700	0	.00	23	.01
SBT	4	6800	3271	.48*	2082	.31*
SBR	d	1700	628	.37	370	.22
EBL	2	3400	186	.05*	649	.19*
EBT	0.5	3400	20	{.01}	17	{.04}
EBR	1.5		196		325	
WBL	1	1700	3	.00	6	.00
WBT	1	1700	5	.00*	10	.01*
WBR	0	0	3		13	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .71

131 . Jamboree Rd. SB at Walnut Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	446	.13	371	.11
SBT	2	3400	710	.21*	696	.20*
SBR	1	1700	309	.18	174	.10
EBL	0	0	0		0	
EBT	3	5100	474	.09*	609	.12*
EBR	1	1700	212	.12	352	.21
WBL	2	3400	308	.09*	292	.09*
WBT	3	5100	481	.09	816	.16
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.03*	EBR	.09*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .47 .55

132 . Jamboree Rd. NB at Walnut Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	267	.08	578	.17
NBT	2	3400	426	.13*	644	.19*
NBR	d	1700	336	.20	542	.32
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3400	39	.01	205	.06*
EBT	3	5100	894	.18*	838	.16
EBR	0	0	0		0	
WBL	0	0	4		0	
WBT	3	5100	853	.17	912	.18*
WBR	1	1700	525	.31	600	.35
Right Turn Adjustment			Multi	.21*	Multi	.24*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .72

133 . Jamboree Rd. at Edinger Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	81	.02	196	.06
NBT	0	0	0		0	
NBR	1	1700	119	.07	374	.22
SBL	2	3400	460	.14*	553	.16*
SBT	0	0	0		0	
SBR	f		970		407	
EBL	2	3400	278	.08*	669	.20*
EBT	3	5100	864	.17	918	.20
EBR	0	0	11		83	
WBL	2	3400	199	.06	177	.05
WBT	3	5100	1224	.24*	1010	.20*
WBR	1	1700	564	.33	383	.23
Right Turn Adjustment					NBR	.07*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .51 .68

134 . Loop Rd. at Warner Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	24	.01	80	.05
NBT	2	3400	7	.00*	192	.06*
NBR	1	1700	87	.05	442	.26
SBL	1	1700	155	.09*	191	.11*
SBT	2	3400	137	.04	275	.08
SBR	f		1034		296	
EBL	2	3400	42	.01	41	.01
EBT	2	3400	788	.23*	2087	.61*
EBR	1	1700	79	.05	31	.02
WBL	2	3400	144	.04*	332	.10*
WBT	2	3400	872	.26	716	.21
WBR	1	1700	11	.01	29	.02
Right Turn Adjustment			NBR	.02*	NBR	.12*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .43 1.05

136 . Jamboree Rd. at Barranca Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	169	.05*	262	.08
NBT	4	6800	1052	.15	3167	.47*
NBR	f		121		260	
SBL	2	3400	400	.12	409	.12*
SBT	4	6800	3168	.47*	1578	.23
SBR	f		1089		383	
EBL	2.5		210	.06	1102	
EBT	2.5	8500	609	.12*	792	.22*
EBR	1	1700	102	.06	116	.07
WBL	2	3400	270	.08	248	.07
WBT	3	5100	852	.17*	876	.17*
WBR	f		238		506	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing

TOTAL CAPACITY UTILIZATION .86 1.03

137 . Jamboree Rd. at Beckman Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	34	.02*	8	.00
NBT	4	6800	1249	.20	3507	.52*
NBR	0	0	120		32	
SBL	1	1700	68	.04	39	.02*
SBT	4	6800	3422	.53*	1871	.28
SBR	0	0	181		33	
EBL	1	1700	66	.04*	212	.12*
EBT	1	1700	12	.01	19	.01
EBR	d	1700	5	.00	10	.01
WBL	1	1700	93	.05	49	.03
WBT	1	1700	35	.05*	10	.04*
WBR	0	0	55		51	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .75

138 . Jamboree Rd. at Alton Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	261	.08*	217	.06
NBT	5	8500	1042	.12	2931	.34*
NBR	1	1700	176	.10	212	.12
SBL	2	3400	248	.07	215	.06*
SBT	4	6800	2840	.46*	1685	.27
SBR	0	0	299		170	
EBL	2	3400	75	.02*	220	.06
EBT	3	5100	286	.07	1194	.27*
EBR	0	0	70		164	
WBL	2	3400	170	.05	263	.08*
WBT	3	5100	891	.17*	535	.10
WBR	d	1700	183	.11	213	.13
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .78 .80

139 . Jamboree Rd. at McGaw Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	235	.07*	70	.02
NBT	4	6800	1401	.21	3086	.46*
NBR	0	0	27		58	
SBL	2	3400	17	.01	19	.01*
SBT	4	6800	2677	.44*	1936	.29
SBR	0	0	293		41	
EBL	1	1700	49	.03*	268	.16*
EBT	2	3400	37	.02	163	.10
EBR	0	0	44	.03	209	.12
WBL	1	1700	24	.01	35	.02
WBT	2	3400	73	.03*	29	.02*
WBR	0	0	13		26	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .70

140 . Jamboree Rd. at Kelvin Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	156	.09*	121	.07
NBT	4	6800	1540	.25	3215	.51*
NBR	0	0	130		228	
SBL	1	1700	10	.01	11	.01*
SBT	4	6800	3039	.45*	2407	.35
SBR	d	1700	25	.01	27	.02
EBL	1	1700	32	.02	23	.01
EBT	1	1700	10	.01*	11	.01*
EBR	d	1700	88	.05	116	.07
WBL	1	1700	72	.04*	101	.06*
WBT	1	1700	9	.01	12	.01
WBR	0	0	9		7	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .64 .64

141 . Jamboree Rd. at Main St.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	602	.18*	492	.14
NBT	4	6800	1598	.24	2629	.39*
NBR	f		206		443	
SBL	2	3400	437	.13	308	.09*
SBT	4	6800	2361	.35*	2255	.33
SBR	1	1700	535	.31	183	.11
EBL	2	3400	113	.03	470	.14
EBT	3	5100	247	.05*	1099	.22*
EBR	f		221		710	
WBL	2	3400	638	.19*	564	.17*
WBT	3	5100	613	.12	335	.07
WBR	f		90		310	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .82 .92

143 . Jamboree Rd. at I-405 NB Ramps

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1651	.32*	3348	.66*
NBR	f		490		900	
SBL	0	0	0		0	
SBT	4	6800	1717	.25	2454	.36
SBR	f		1630		1140	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	3	5100	1413	.28*	686	.13*
WBT	0	0	0		0	
WBR	f		969		222	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .84

144 . Jamboree Rd. at I-405 SB Ramps

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1367	.20	2723	.40*
NBR	f		518		990	
SBL	0	0	0		0	
SBT	4	6800	2813	.41*	2648	.39
SBR	f		274		660	
EBL	1.5		796	{.34}*	1447	.43*
EBT	0	6800	0	.34	0	
EBR	2.5		1542		662	.19
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .80 .88

145 . Jamboree Rd. at Michelson Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	217	.13*	85	.05
NBT	4	6800	1303	.19	2251	.33*
NBR	f		199		521	
SBL	2	3400	557	.16	937	.28*
SBT	4	6800	2443	.36*	1948	.29
SBR	f		609		488	
EBL	2	3400	203	.06*	1019	.30*
EBT	2	3400	194	.08	363	.16
EBR	0	0	73		186	
WBL	2	3400	304	.09	308	.09
WBT	2	3400	484	.14*	308	.09*
WBR	f		384		613	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 1.05

146 . Jamboree Rd. at Dupont Rd.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	211	.12*	94	.06*
NBT	4	6800	1537	.23	2463	.36
NBR	1	1700	11	.01	31	.02
SBL	1	1700	49	.03	171	.10
SBT	3	5100	2351	.46*	2083	.41*
SBR	d	1700	443	.26	187	.11
EBL	1	1700	54	.03*	337	.20*
EBT	2	3400	10	.01	58	.03
EBR	0	0	35	.02	286	.17
WBL	1	1700	34	.02	31	.02
WBT	2	3400	49	.03*	19	.01*
WBR	0	0	126	.07	50	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .73

164 . Construction S. at Barranca Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02*	337	.20*
NBT	1	1700	9	.01	13	.16
NBR	0	0	11		260	
SBL	1	1700	30	.02	27	.02
SBT	1	1700	50	.03*	18	.01*
SBR	1	1700	121	.07	85	.05
EBL	1	1700	142	.08	108	.06*
EBT	3	5100	949	.19*	1354	.27
EBR	1	1700	113	.07	23	.01
WBL	1	1700	247	.15*	79	.05
WBT	3	5100	1018	.20	1458	.29*
WBR	d	1700	29	.02	29	.02
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .44 .61

168 . Murphy Av. at Alton Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	28	.02	78	.05
NBT	1	1700	17	.05*	119	.27*
NBR	0	0	65		344	
SBL	1	1700	24	.01*	101	.06*
SBT	1	1700	26	.03	38	.10
SBR	0	0	30		131	
EBL	1	1700	117	.07*	51	.03
EBT	3	5100	523	.10	1475	.29*
EBR	d	1700	46	.03	30	.02
WBL	1	1700	119	.07	72	.04*
WBT	3	5100	1267	.25*	791	.16
WBR	d	1700	106	.06	19	.01
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .43 .71

170 . Union at Main St.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	125	.04*	590	.17*
NBT	1	1700	3	.01	8	.05
NBR	0	0	12		73	
SBL	1	1700	14	.01	34	.02
SBT	1	1700	2	.00*	1	.00*
SBR	1	1700	33	.02	35	.02
EBL	2	3400	91	.03*	106	.03
EBT	3	5100	496	.10	1708	.33*
EBR	f		287		94	
WBL	2	3400	62	.02	35	.01*
WBT	3	5100	1257	.25*	579	.12
WBR	0	0	6		27	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .37 .56

171 . Veneto at Main St.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	237	.07*	159	.05
NBT	1	1700	7	.02	24	.12*
NBR	0	0	26		177	
SBL	1	1700	46	.03	29	.02*
SBT	1	1700	12	.05*	7	.02
SBR	0	0	72		23	
EBL	1	1700	25	.01*	99	.06
EBT	3	5100	301	.07	1551	.32*
EBR	0	0	55		90	
WBL	2	3400	75	.02	43	.01*
WBT	3	5100	925	.19*	370	.08
WBR	0	0	19		36	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .37 .52

174 . Carlson Av. at Michelson Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	473	.14*	123	.04*
NBT	2	3400	112	.03	74	.02
NBR	1	1700	155	.09	343	.20
SBL	2	3400	17	.01	88	.03
SBT	1	1700	17	.01*	107	.06*
SBR	f		136		386	
EBL	2	3400	376	.11*	424	.12
EBT	2	3400	518	.15	990	.29*
EBR	1	1700	75	.04	414	.24
WBL	1	1700	148	.09	249	.15*
WBT	2	3400	611	.18*	711	.21
WBR	f		52		103	
Right Turn Adjustment					NBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .49 .61

175 . Carlson Av. at Campus Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	231	.14*	241	.14*
SBT	0	0	2		0	
SBR	1	1700	329	.19	159	.09
EBL	1	1700	146	.09*	335	.20*
EBT	2	3400	1059	.31	1559	.46
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	1401	.41*	1201	.35*
WBR	d	1700	144	.08	235	.14
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .74

180 . Harvard Av. at Walnut Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	306	.09*	350	.10*
NBT	1	1700	69	.04	70	.04
NBR	d	1700	155	.09	221	.13
SBL	1	1700	192	.11	124	.07
SBT	1	1700	123	.07*	52	.03*
SBR	1	1700	146	.09	65	.04
EBL	1	1700	38	.02*	124	.07
EBT	2	3400	514	.15	825	.24*
EBR	1	1700	309	.18	325	.19
WBL	1	1700	139	.08	193	.11*
WBT	2	3400	1048	.31*	795	.23
WBR	d	1700	113	.07	46	.03
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.54		.53

181 . Harvard Av. at Edinger Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	245	.07	248	.07
NBT	2	3400	218	.06*	477	.14*
NBR	1	1700	149	.09	296	.17
SBL	1	1700	281	.17*	142	.08*
SBT	2	3400	367	.11	230	.07
SBR	d	1700	136	.08	87	.05
EBL	2	3400	91	.03*	167	.05*
EBT	3	5100	1169	.23	1266	.25
EBR	1	1700	203	.12	108	.06
WBL	2	3400	299	.09	112	.03
WBT	3	5100	1499	.32*	1449	.32*
WBR	0	0	121		167	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.63		.64

182 . Harvard Av. at Paseo Westpark

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	115	.07*	0	.00
NBT	2	3400	304	.09	901	.26*
NBR	d	1700	40	.02	122	.07
SBL	1	1700	40	.02	29	.02*
SBT	2	3400	757	.22*	413	.12
SBR	1	1700	135	.08	103	.06
EBL	1	1700	70	.04	85	.05
EBT	1	1700	100	.06*	170	.10*
EBR	d	1700	0	.00	0	.00
WBL	1	1700	193	.11*	77	.05*
WBT	1	1700	0	.00	107	.06
WBR	d	1700	257	.15	104	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.51		.48

183 . Harvard Av. at Warner Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	129	.08*	267	.16
NBT	2	3400	273	.08	978	.29*
NBR	d	1700	78	.05	135	.08
SBL	1	1700	143	.08	74	.04*
SBT	2	3400	881	.26*	400	.12
SBR	d	1700	176	.10	86	.05
EBL	1	1700	174	.10*	254	.15*
EBT	2	3400	399	.12	661	.19
EBR	d	1700	147	.09	124	.07
WBL	1	1700	112	.07	76	.04
WBT	2	3400	645	.19*	597	.18*
WBR	d	1700	93	.05	108	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.68		.71

184 . Harvard Av. at Barranca Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	161	.09*	316	.19
NBT	2	3400	371	.11	1073	.32*
NBR	1	1700	78	.05	126	.07
SBL	1	1700	176	.10	97	.06*
SBT	2	3400	764	.22*	407	.12
SBR	1	1700	209	.12	67	.04
EBL	2	3400	59	.02*	162	.05*
EBT	3	5100	506	.10	1067	.21
EBR	1	1700	165	.10	241	.14
WBL	2	3400	201	.06	122	.04
WBT	3	5100	1099	.23*	867	.20*
WBR	0	0	90		135	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .68

185 . Harvard Av. at Alton Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	319	.09*	154	.05
NBT	2	3400	422	.12	1237	.36*
NBR	d	1700	89	.05	190	.11
SBL	1	1700	34	.02	93	.05*
SBT	2	3400	882	.26*	514	.15
SBR	1	1700	274	.16	106	.06
EBL	2	3400	107	.03*	319	.09
EBT	3	5100	297	.06	1157	.23*
EBR	1	1700	156	.09	277	.16
WBL	2	3400	202	.06	180	.05*
WBT	3	5100	977	.20*	520	.11
WBR	0	0	41		64	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .63 .74

186 . Harvard Av. at Main St.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	80	.02*	111	.03
NBT	2	3400	374	.11	1159	.34*
NBR	1	1700	69	.04	300	.18
SBL	2	3400	72	.02	37	.01*
SBT	2	3400	983	.29*	702	.21
SBR	1	1700	461	.27	150	.09
EBL	2	3400	161	.05*	715	.21
EBT	3	5100	199	.05	1273	.30*
EBR	0	0	73		243	
WBL	2	3400	364	.11	126	.04*
WBT	3	5100	669	.14*	188	.04
WBR	0	0	44		26	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .74

187 . Harvard Av. at Coronado

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	185	.05*	210	.06
NBT	2	3400	434	.13	1405	.43*
NBR	0	0	10		42	
SBL	1	1700	30	.02	66	.04*
SBT	2	3400	1233	.36*	893	.26
SBR	d	1700	165	.10	64	.04
EBL	2	3400	41	.01*	93	.03
EBT	1	1700	1	.00	64	.04*
EBR	d	1700	151	.09	263	.15
WBL	1	1700	37	.02	17	.01*
WBT	1	1700	10	.01*	11	.01
WBR	1	1700	85	.05	52	.03
Right Turn Adjustment			EBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .57

188 . Harvard Av. at Michelson Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	112	.07*	69	.04
NBT	2	3400	317	.10	1022	.34*
NBR	0	0	33		118	
SBL	1	1700	158	.09	342	.20*
SBT	2	3400	822	.24*	631	.19
SBR	1	1700	419	.25	206	.12
EBL	2	3400	94	.03*	396	.12
EBT	2	3400	209	.06	893	.26*
EBR	f		49		131	
WBL	1	1700	149	.09	99	.06*
WBT	2	3400	679	.25*	316	.15
WBR	0	0	158		185	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.64		.91

189 . Harvard Av. at University Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	105	.06*	104	.06
NBT	2	3400	286	.08	684	.20*
NBR	d	1700	80	.05	299	.18
SBL	1	1700	18	.01	75	.04*
SBT	2	3400	592	.17*	564	.17
SBR	d	1700	369	.22	265	.16
EBL	1	1700	124	.07*	509	.30*
EBT	3	5100	744	.16	1946	.40
EBR	0	0	76		97	
WBL	1	1700	223	.13	179	.11
WBT	3	5100	2301	.47*	1031	.21*
WBR	0	0	81		37	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.82		.80

190 . University Dr. at Campus Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	206	.06*	327	.10
NBT	3	5100	638	.13	1570	.31*
NBR	1	1700	480	.28	420	.25
SBL	2	3400	124	.04	97	.03*
SBT	3	5100	1984	.39*	1080	.21
SBR	1	1700	364	.21	146	.09
EBL	2	3400	334	.10*	526	.15*
EBT	2	3400	855	.25	925	.27
EBR	d	1700	35	.02	167	.10
WBL	2	3400	42	.01	286	.08
WBT	2	3400	751	.22*	1029	.30*
WBR	d	1700	218	.13	127	.07
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.82		.84

191 . Mesa Rd. at University Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	49	.03*	317	.19*
NBT	0	0	0		0	
NBR	1	1700	90	.05	284	.17
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1270	.25*	2176	.43*
EBR	1	1700	246	.14	113	.07
WBL	1	1700	254	.15*	197	.12*
WBT	3	5100	1971	.39	1293	.25
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.48		.79

192 . California Av. at University Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	225	.07*	778	.23*
NBT	0	0	0		0	
NBR	1	1700	225	.13	872	.51
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1375	.27*	1383	.27*
EBR	1	1700	890	.52	430	.25
WBL	2	3400	830	.24*	231	.07*
WBT	3	5100	1225	.24	1427	.28
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.20*	NBR	.23*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .83 .85

193 . MacArthur Blvd. NB at University Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	37	.02*	14	.01*
NBT	0	0	0		0	
NBR	1	1700	329	.19	332	.20
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1941	.38*	1448	.28*
EBR	d	1700	147	.09	109	.06
WBL	2	3400	543	.16*	1211	.36*
WBT	3	5100	903	.18	956	.19
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .70

196 . Hearthstone Bl. at ICD

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	28	.02*	33	.02*
NBT	2	3400	42	.01	53	.02
NBR	d	1700	409	.24	308	.18
SBL	1	1700	43	.03	27	.02
SBT	1	1700	42	.02*	37	.02*
SBR	d	1700	26	.02	26	.02
EBL	1	1700	33	.02	81	.05
EBT	3	5100	1519	.32*	1645	.34*
EBR	0	0	101		82	
WBL	1	1700	237	.14*	391	.23*
WBT	3	5100	1746	.35	1871	.37
WBR	0	0	15		36	
Right Turn Adjustment			NBR	.12*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .66

198 . Paseo Westpark at Warner Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	134	.08
NBT	1	1700	85	.05	269	.16*
NBR	d	1700	37	.02	48	.03
SBL	1	1700	64	.04	58	.03*
SBT	1	1700	327	.19*	112	.07
SBR	d	1700	71	.04	58	.03
EBL	1	1700	153	.09*	119	.07*
EBT	2	3400	450	.13	567	.17
EBR	d	1700	90	.05	152	.09
WBL	1	1700	93	.05	66	.04
WBT	2	3400	639	.19*	582	.17*
WBR	d	1700	152	.09	94	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .48

199 . Paseo Westpark at Barranca Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	86	.03*	173	.05
NBT	1	1700	114	.07	342	.20*
NBR	1	1700	172	.10	225	.13
SBL	2	3400	116	.03	88	.03*
SBT	1	1700	259	.15*	164	.10
SBR	d	1700	75	.04	68	.04
EBL	1	1700	32	.02*	102	.06
EBT	3	5100	676	.13	1151	.23*
EBR	1	1700	96	.06	166	.10
WBL	1	1700	237	.14	150	.09*
WBT	3	5100	1413	.29*	962	.22
WBR	0	0	64		148	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .60

200 . Paseo Westpark at Alton Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	86	.05	84	.05
NBT	1	1700	144	.15*	296	.23*
NBR	0	0	111		100	
SBL	1	1700	194	.11*	94	.06*
SBT	1	1700	152	.09	127	.07
SBR	1	1700	226	.13	139	.08
EBL	1	1700	26	.02*	88	.05
EBT	3	5100	505	.12	836	.18*
EBR	0	0	111		57	
WBL	1	1700	137	.08	127	.07*
WBT	3	5100	1138	.22*	677	.13
WBR	d	1700	139	.08	166	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .59

201 . Paseo Westpark at Main St.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	179	.11	46	.03
NBT	1	1700	194	.19*	323	.22*
NBR	0	0	127		56	
SBL	1	1700	159	.09*	47	.03*
SBT	1	1700	241	.14	132	.08
SBR	1	1700	150	.09	75	.04
EBL	1	1700	16	.01*	59	.03
EBT	2	3400	326	.10	667	.20*
EBR	d	1700	138	.08	111	.07
WBL	1	1700	83	.05	27	.02*
WBT	2	3400	916	.27*	260	.08
WBR	d	1700	131	.08	67	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .52

221 . Culver Dr. at Bryan Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	390	.11*	689	.20*
NBT	3	5100	671	.13	1576	.31
NBR	1	1700	230	.14	536	.32
SBL	2	3400	135	.04	154	.05
SBT	3	5100	2185	.43*	906	.18*
SBR	d	1700	350	.21	149	.09
EBL	2	3400	139	.04*	252	.07*
EBT	1.5	5100	255	{.12}	470	{.14}
EBR	1.5		516		458	{.12}
WBL	2	3400	559	.16	276	.08
WBT	2	3400	691	.26*	652	.24*
WBR	0	0	181		172	
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .89 .74

222 . Culver Dr. at Trabuco Rd.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	558	.11*	1851	.36*
NBR	f		1058		1461	
SBL	1	1700	732	.43*	360	.21*
SBT	3	5100	2419	.47	1269	.25
SBR	f		710		179	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	654	.19*	512	.15*
WBT	0	0	0		0	
WBR	2	3400	828	.24	887	.26
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .78 .77

223 . Culver Dr. at I-5 SB Ramps

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1218	.24	1983	.39*
NBR	f		241		301	
SBL	0	0	0		0	
SBT	3	5100	2183	.43*	1486	.29
SBR	f		322		251	
EBL	3	5100	522	.10*	1048	.21*
EBT	0	0	0		0	
EBR	2	3400	402	.12	912	.27
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .65

224 . Culver Dr. at Walnut Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	172	.05*	360	.11
NBT	3	5100	769	.15	1609	.32*
NBR	1	1700	299	.18	371	.22
SBL	2	3400	271	.08	394	.12*
SBT	3	5100	1922	.38*	1440	.28
SBR	1	1700	467	.27	287	.17
EBL	2	3400	369	.11*	577	.17*
EBT	2	3400	651	.19	545	.16
EBR	1	1700	250	.15	138	.08
WBL	2	3400	453	.13	402	.12
WBT	2	3400	753	.22*	733	.22*
WBR	1	1700	284	.17	255	.15
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .81 .88

225 . Culver Dr. at Deerfield Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	44	.01*	114	.03
NBT	3	5100	978	.19	1796	.35*
NBR	1	1700	102	.06	133	.08
SBL	2	3400	157	.05	147	.04*
SBT	3	5100	2150	.42*	1536	.30
SBR	1	1700	260	.15	312	.18
EBL	1	1700	195	.11*	451	.27*
EBT	1	1700	181	.11	170	.10
EBR	d	1700	123	.07	171	.10
WBL	1	1700	172	.10	83	.05
WBT	1	1700	177	.21*	94	.13*
WBR	0	0	179		123	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .80 .84

226 . Culver Dr. at ICD

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	323	.10*	357	.11
NBT	4	6800	695	.10	1465	.22*
NBR	f		211		387	
SBL	2	3400	217	.06	292	.09*
SBT	4	6800	1836	.27*	1323	.19
SBR	1	1700	327	.19	215	.13
EBL	2	3400	253	.07	313	.09*
EBT	3	5100	1194	.23*	1191	.23
EBR	f		283		195	
WBL	2	3400	405	.12*	262	.08
WBT	3	5100	1312	.26	1308	.26*
WBR	f		113		202	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .77 .71

227 . Culver Dr. at Warner Av.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	153	.09*	284	.17*
NBT	3	5100	1057	.21	1883	.37
NBR	1	1700	70	.04	191	.11
SBL	1	1700	79	.05	97	.06
SBT	3	5100	2291	.45*	1385	.27*
SBR	d	1700	200	.12	289	.17
EBL	2	3400	259	.08*	239	.07*
EBT	2	3400	241	.07	252	.07
EBR	d	1700	257	.15	209	.12
WBL	1	1700	225	.13	126	.07
WBT	2	3400	398	.12*	227	.07*
WBR	d	1700	146	.09	148	.09
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .80 .63

228 . Culver Dr. at Barranca Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	145	.04*	266	.08
NBT	3	5100	739	.14	1712	.34*
NBR	1	1700	367	.22	381	.22
SBL	2	3400	351	.10	292	.09*
SBT	3	5100	2109	.41*	1195	.23
SBR	f		306		213	
EBL	2	3400	456	.13	336	.10*
EBT	2	3400	902	.27*	707	.21
EBR	1	1700	213	.13	458	.27
WBL	2	3400	388	.11*	267	.08
WBT	3	5100	839	.19	711	.20*
WBR	0	0	145		332	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .88 .78

229 . Culver Dr. at Alton Pkwy.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	115	.03*	264	.08
NBT	3	5100	993	.19	2063	.40*
NBR	1	1700	267	.16	354	.21
SBL	2	3400	164	.05	205	.06*
SBT	3	5100	2143	.42*	1164	.23
SBR	f		279		220	
EBL	2	3400	126	.04*	291	.09
EBT	2	3400	524	.15	831	.24*
EBR	1	1700	162	.10	279	.16
WBL	2	3400	444	.13	338	.10*
WBT	2	3400	910	.27*	696	.20
WBR	1	1700	215	.13	246	.14
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .81 .85

230 . Culver Dr. at Main St.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	135	.04*	111	.03
NBT	3	5100	1110	.22	2119	.42*
NBR	1	1700	150	.09	488	.29
SBL	2	3400	63	.02	204	.06*
SBT	3	5100	2180	.43*	1545	.30
SBR	f		501		142	
EBL	2	3400	172	.05	546	.16*
EBT	2	3400	119	.04*	410	.12
EBR	f		102		147	
WBL	2	3400	529	.16*	161	.05
WBT	2	3400	321	.09	77	.02*
WBR	1	1700	118	.07	81	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .71

231 . Culver Dr. at Paseo Westpark

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	190	.11*	229	.13
NBT	3	5100	1302	.26	2596	.51*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2677	.52*	1794	.35
SBR	d	1700	150	.09	71	.04
EBL	1	1700	81	.05*	59	.03*
EBT	0	0	0		0	
EBR	1	1700	320	.19	70	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.06*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .79 .59

232 . Culver Dr. at I-405 NB Ramps

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	794	.16	2053	.40*
NBR	f		560		400	
SBL	0	0	0		0	
SBT	3	5100	1290	.25*	1201	.24
SBR	f		930		660	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	760	.22*	449	.13*
WBT	0	0	0		0	
WBR	1	1700	556	.33	807	.47
Right Turn Adjustment			WBR	.04*	WBR	.34*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .56 .92

233 . Culver Dr. at I-405 SB Ramps

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	986	.19	1582	.31*
NBR	f		231		670	
SBL	0	0	0		0	
SBT	3	5100	1752	.34*	1228	.24
SBR	f		251		330	
EBL	1.5		300	{.16}*	898	.26*
EBT	0	5100	0	.16	0	
EBR	1.5		530		502	{.24}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .62

234 . Culver Dr. at Michelson Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	116	.03*	338	.10
NBT	3	5100	961	.19	1847	.38*
NBR	0	0	11		76	
SBL	2	3400	185	.05	506	.15*
SBT	3	5100	1818	.36*	921	.18
SBR	1	1700	269	.16	290	.17
EBL	2	3400	236	.07	305	.09
EBT	1	1700	127	.07*	159	.09*
EBR	1	1700	216	.13	223	.13
WBL	1	1700	85	.05*	175	.10*
WBT	2	3400	85	.03	132	.04
WBR	1	1700	181	.11	268	.16
Right Turn Adjustment			EBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .77

235 . Culver Dr. at University Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	69	.04
NBT	4	6800	1462	.22*	1671	.25*
NBR	2	3400	392	.12	936	.28
SBL	2	3400	29	.01*	31	.01*
SBT	4	6800	1310	.19	1185	.17
SBR	d	1700	374	.22	337	.20
EBL	2	3400	51	.02	391	.12
EBT	3	5100	621	.12*	1073	.21*
EBR	d	1700	17	.01	25	.01
WBL	2	3400	676	.20*	781	.23*
WBT	3	5100	1429	.29	724	.15
WBR	0	0	29		59	
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for NBR						

TOTAL CAPACITY UTILIZATION .60 .75

337 . Von Karman Ave. at Quartz

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	426	.25*	205	.12*
NBT	2	3400	972	.29	1182	.35
NBR	1	1700	194	.11	63	.04
SBL	1	1700	170	.10	84	.05
SBT	2	3400	844	.25*	1227	.36*
SBR	d	1700	236	.14	100	.06
EBL	2	3400	44	.01*	187	.06*
EBT	1	1700	6	.00	6	.00
EBR	1	1700	64	.04	446	.26
WBL	1	1700	32	.02	59	.03
WBT	1	1700	18	.01*	11	.01*
WBR	f		54		160	
Right Turn Adjustment					EBR	.13*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .73

439 . Bixby at Michleson Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	11	.01*	24	.01*
NBT	1	1700	4	.01	3	.02
NBR	0	0	5		23	
SBL	2	3400	14	.00	126	.04
SBT	1	1700	5	.02*	4	.12*
SBR	0	0	31		200	
EBL	1	1700	209	.12*	106	.06*
EBT	2	3400	371	.12	581	.18
EBR	0	0	40		28	
WBL	1	1700	34	.02	68	.04
WBT	2	3400	288	.08*	706	.21*
WBR	1	1700	87	.05	41	.02
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .28 .45

440 . Siglo at Main St.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	16	.00	169	.05*
SBT	0	0	0		0	
SBR	1	1700	14	.01	51	.03
EBL	2	3400	27	.01*	40	.01
EBT	3	5100	519	.10	2111	.41*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5100	1580	.31*	969	.19
WBR	1	1700	144	.08	20	.01
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .37 .51

441 . Loop Rd. at Jamboree Rd. SB Ramps

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	17	.01	119	.04*
NBR	1	1700	22	.01	70	.04
SBL	1	1700	28	.02	30	.02*
SBT	2	3400	221	.07*	150	.04
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		547	.16*	270	.08*
WBT	0	5100	0		0	
WBR	1.5		54		91	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .28 .19

472 . Obsidian at Michleson Dr.

P2030 Constraint No Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	5		4	
NBT	1	1700	0	.01*	0	.01*
NBR	0	0	16		6	
SBL	0	0	10	{.01}*	136	{.08}*
SBT	1	1700	0	.01	0	.08
SBR	f		21		94	
EBL	1	1700	114	.07*	48	.03
EBT	2	3400	334	.10	688	.20*
EBR	0	0	10		5	
WBL	1	1700	10	.01	5	.00
WBT	2	3400	1055	.31*	592	.17
WBR	f		136		52	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .34

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\noProj\EXE-193\ICU\P30NP-C-NPB01-102809

61 . Airport Wy. at Campus Dr.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	2	3200	386	.12	626	.20
EBL	1	1600	201	.13	261	.16*
EBT	3	4800	1400	.29*	940	.20
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	444	.11	1384	.34*
WBR	0	0	99		269	
Right Turn Adjustment			SBR	.12*	SBR	.20*
TOTAL CAPACITY UTILIZATION				.41		.70

62 . Campus Dr. at Bristol St. NB

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	603	.19	734	.23*
NBT	3	4800	2174	.45*	669	.14
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6400	240	.04	985	.15*
SBR	2	3200	345	.11	1168	.37
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	210	.13	315	.20
WBT	5	8000	1453	.23*	2408	.32*
WBR	0	0	426	.27	131	
Right Turn Adjustment			WBR	.04*	SBR	.22*
TOTAL CAPACITY UTILIZATION				.72		.92

63 . Campus Dr. at Bristol St. SB

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	5	8000	1337	.19*	775	.12*
NBR	0	0	217		216	.14
SBL	1	1600	191	.12*	303	.19*
SBT	3	4800	266	.06	1035	.22
SBR	0	0	0		0	
EBL	1.5		1413	{.52}*	525	{.24}*
EBT	2.5	6400	1911	.52	1041	.24
EBR	2	3200	394	.12	435	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.02*
TOTAL CAPACITY UTILIZATION				.83		.57

64 . Birch St. at Bristol St. NB

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	244	.08	300	.09*
NBT	2	3200	1249	.39*	690	.22
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	1.5	6400	312	.10	817	.30*
SBR	2.5		221	.07	1133	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		658		765	
WBT	3.5	8000	1655	.33*	1563	.31*
WBR	0		361		191	
TOTAL CAPACITY UTILIZATION				.72		.70

65 . Birch St. at Bristol St. SB

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2.5	6400	536	.15*	638	.16
NBR	1.5		396		391	
SBL	2	3200	274	.09*	351	.11
SBT	2	3200	629	.20	1241	.39*
SBR	0	0	0		0	
EBL	1.5		744	{.26}*	302	
EBT	3	8000	990	.26	1098	.20*
EBR	0.5		341		189	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .50 .59

84 . MacArthur Bl. at Campus Dr.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	49	.02	92	.03
NBT	4	6400	1080	.17*	1075	.17*
NBR	1	1600	113	.07	69	.04
SBL	1	1600	363	.23*	220	.14*
SBT	3.5	8000	1131	.18	1273	.25
SBR	1.5		243	.15	703	
EBL	2	3200	450	.14	389	.12*
EBT	3	4800	894	.19*	582	.12
EBR	d	1600	97	.06	104	.07
WBL	2	3200	82	.03*	154	.05
WBT	3	4800	338	.07	1185	.25*
WBR	f		170		225	

TOTAL CAPACITY UTILIZATION .62 .68

85 . MacArthur Bl. at Birch St.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	45	.03	125	.08*
NBT	3	4800	1736	.36*	1200	.25
NBR	f		110		51	
SBL	1	1600	178	.11*	179	.11
SBT	4	6400	823	.16	2221	.38*
SBR	0	0	197		212	
EBL	1.5		168	.11*	288	{.16}*
EBT	1.5	4800	538	.19	463	.16
EBR	0		74		22	
WBL	1	1600	58	.04	124	.08
WBT	2	3200	472	.15*	967	.30*
WBR	f		140		179	

TOTAL CAPACITY UTILIZATION .73 .92

105 . Von Karman Av. at Campus Dr.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	16	.01	85	.05*
NBT	2	3200	739	.23*	579	.18
NBR	f		89		159	
SBL	1	1600	92	.06*	230	.14
SBT	2	3200	480	.19	971	.40*
SBR	0	0	113		322	
EBL	2	3200	279	.09	245	.08*
EBT	2	3200	649	.21*	611	.21
EBR	0	0	37		57	
WBL	1	1600	94	.06*	122	.08
WBT	2	3200	431	.17	984	.34*
WBR	0	0	121		96	

TOTAL CAPACITY UTILIZATION .56 .87

106 . Von Karman Av. at Birch St.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	46	.03	89	.06*
NBT	2	3200	591	.21*	506	.19
NBR	0	0	68		114	
SBL	1	1600	54	.03*	47	.03
SBT	2	3200	287	.16	619	.27*
SBR	0	0	222		233	
EBL	1	1600	109	.07*	199	.12*
EBT	2	3200	278	.11	431	.15
EBR	0	0	61		51	
WBL	1	1600	112	.07	32	.02
WBT	2	3200	522	.17*	461	.17*
WBR	0	0	30		67	

TOTAL CAPACITY UTILIZATION .48 .62

107 . Von Karman Av. at MacArthur Bl.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	35	.02*	144	.09
NBT	2	3200	119	.04	243	.08*
NBR	f		36		184	
SBL	2	3200	137	.04	703	.22*
SBT	1	1600	167	.10*	103	.06
SBR	f		26		63	
EBL	1	1600	65	.04*	60	.04
EBT	3	4800	437	.09	953	.20*
EBR	f		159		56	
WBL	1	1600	84	.05	41	.03*
WBT	3	4800	898	.19*	623	.13
WBR	f		716		158	

TOTAL CAPACITY UTILIZATION .35 .53

121 . Teller Av. at Campus Dr.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	6	.00	39	.02*
NBT	1	1600	22	.01	45	.03
NBR	1	1600	22	.01	55	.03
SBL	1	1600	28	.02	116	.07
SBT	1	1600	67	.09*	69	.14*
SBR	0	0	75		147	
EBL	1	1600	73	.05*	37	.02
EBT	2	3200	628	.20	994	.31*
EBR	f		33		20	
WBL	1	1600	41	.03	41	.03*
WBT	2	3200	668	.25*	658	.22
WBR	0	0	117		48	

TOTAL CAPACITY UTILIZATION .39 .50

147 . Jamboree Rd. at Campus Dr.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	181	.06	101	.03
NBT	4	6400	1369	.21*	1851	.29*
NBR	1	1600	137	.09	515	.32
SBL	2	3200	562	.18*	414	.13*
SBT	4	6400	1684	.28	1778	.30
SBR	0	0	133		160	
EBL	2	3200	131	.04	400	.13*
EBT	2	3200	521	.16*	674	.21
EBR	f		39		286	
WBL	2	3200	697	.22*	278	.09
WBT	2	3200	555	.17	580	.18*
WBR	1	1600	240	.15	423	.26

Note: Assumes Right-Turn Overlap for WBR NBR

TOTAL CAPACITY UTILIZATION .77 .73

148 . Jamboree Rd. at Birch St.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	189	.12*	162	.10*
NBT	3	4800	1571	.33	1864	.39
NBR	0	0	1		1	
SBL	1	1600	5	.00	1	.00
SBT	4	6400	1897	.30*	2076	.32*
SBR	f		534		218	
EBL	1.5		147	{.05}*	456	{.14}*
EBT	0.5	3200	2	.05	0	.14
EBR	f		32		184	
WBL	0	0	0		0	
WBT	1	1600	0	.00*	0	.00*
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .47 .56

149 . Jamboree Rd. at Fairchild Rd.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	14	.01	35	.02
NBT	3	4800	1943	.41*	1799	.38*
NBR	0	0	48		40	
SBL	2	3200	333	.10*	294	.09*
SBT	4	6400	1751	.27	1942	.30
SBR	d	1600	13	.01	4	.00
EBL	1	1600	5	.00	125	.08
EBT	1	1600	0	.00	76	.24*
EBR	0	0	5		306	
WBL	1	1600	7	.00	31	.02*
WBT	1	1600	3	.00*	22	.01
WBR	1	1600	327	.20	296	.19
Right Turn Adjustment			WBR	.20*	WBR	.01*

TOTAL CAPACITY UTILIZATION .71 .74

150 . Jamboree Rd. at MacArthur Bl.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	431	.13*	213	.07*
NBT	4	6400	1132	.18	1064	.17
NBR	1	1600	254	.16	37	.02
SBL	3	4800	541	.11	622	.13
SBT	3	4800	920	.19*	1379	.29*
SBR	1	1600	231	.14	155	.10
EBL	2	3200	160	.05*	281	.09
EBT	3	4800	565	.12	1281	.27*
EBR	f		142		314	
WBL	2	3200	157	.05	277	.09*
WBT	3	4800	1607	.33*	712	.15
WBR	1	1600	718	.45	495	.31
Right Turn Adjustment			WBR	.12*	WBR	.04*

TOTAL CAPACITY UTILIZATION .82 .76

151 . Jamboree Rd. at Bristol St. NB-SR73 NB Ramps

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	844	.26*	663	.21*
NBT	3	4800	1610	.34	2137	.45
NBR	f		0		0	
SBL	0	0	0		0	
SBT	2.5	6400	560	.15*	1202	.32*
SBR	1.5		386		848	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .41 .53

153 . Jamboree Rd. at Bristol St. SB

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	6	9600	1440	.15*	1506	.16
NBR	0	0	41		77	
SBL	0	0	0		0	
SBT	4	6400	539	.08	1097	.17*
SBR	0	0	0		0	
EBL	2.5		1394	{.30}*	1164	{.34}*
EBT	1.5	6400	501	.30	993	.34
EBR	2	3200	795	.25	883	.28
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .45 .51

154 . Jamboree Rd. at Eastbluff Dr.-University Dr.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	34	.02	25	.02*
NBT	3	4800	1292	.27*	1340	.28
NBR	1	1600	214	.13	240	.15
SBL	2	3200	167	.05*	267	.08
SBT	3	4800	1119	.23	1685	.35*
SBR	1	1600	360	.23	501	.31
EBL	1.5		446	{.19}*	269	{.13}*
EBT	0.5	3200	156	.19	120	.13
EBR	0		15		16	
WBL	1.5		276		263	
WBT	1.5	4800	196	.10*	208	.10*
WBR	f		386		226	

TOTAL CAPACITY UTILIZATION .61 .60

155 . Jamboree Rd. at Bison Av.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	1164	.24*	1502	.31
NBR	d	1600	256	.16	153	.10
SBL	2	3200	194	.06*	167	.05
SBT	3	4800	1295	.27	1735	.36*
SBR	1	1600	210	.13	120	.08
EBL	1	1600	112	.07*	69	.04
EBT	0	0	0		0	
EBR	1	1600	82	.05	42	.03
WBL	2	3200	163	.05	413	.13*
WBT	0	0	0		0	
WBR	2	3200	164	.05	248	.08
Right Turn Adjustment			Multi	.08*	EBR	.03*

TOTAL CAPACITY UTILIZATION .45 .52

156 . Jamboree Rd. at Ford Rd.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	305	.10*	312	.10*
NBT	3	4800	1225	.27	1727	.39
NBR	0	0	71		143	
SBL	1	1600	82	.05	62	.04
SBT	3	4800	1416	.29*	2088	.44*
SBR	1	1600	261	.16	87	.05
EBL	1.5		321	{.12}*	112	.07
EBT	1.5	4800	253	.12	256	.08*
EBR	1	1600	197	.12	214	.13
WBL	1.5		85	.05	128	{.07}*
WBT	1.5	4800	394	.12*	201	.07
WBR	1	1600	40	.03	50	.03
Right Turn Adjustment					EBR	.05*

TOTAL CAPACITY UTILIZATION .63 .74

176 . Fairchild Av. at MacArthur Bl.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	49	.03*	526	.33*
SBT	0	0	0		0	
SBR	1	1600	22	.01	194	.12
EBL	1	1600	298	.19*	44	.03
EBT	3	4800	1131	.24	1985	.41*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	2428	.63*	1404	.32
WBR	0	0	602		147	

TOTAL CAPACITY UTILIZATION .85 .74

178 . MacArthur Bl. at Bison Av.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	251	.08	248	.08*
NBT	4	6400	2440	.38*	2429	.38
NBR	1	1600	176	.11	181	.11
SBL	2	3200	83	.03*	222	.07
SBT	4	6400	2008	.31	2713	.42*
SBR	1	1600	322	.20	416	.26
EBL	2	3200	250	.08	228	.07
EBT	2	3200	281	.09*	226	.07*
EBR	f		189		256	
WBL	2	3200	383	.12*	450	.14*
WBT	2	3200	267	.08	426	.13
WBR	1	1600	90	.06	173	.11

TOTAL CAPACITY UTILIZATION .62 .71

179 . MacArthur Bl. at Ford Rd.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	103	.03	58	.02
NBT	4	6400	1920	.30*	2353	.37*
NBR	f		86		470	
SBL	3	4800	552	.12*	798	.17*
SBT	4	6400	1916	.30	2334	.36
SBR	f		13		47	
EBL	2	3200	38	.01	27	.01
EBT	2	3200	273	.09*	303	.09*
EBR	1	1600	118	.07	60	.04
WBL	2	3200	570	.18*	245	.08*
WBT	2	3200	324	.10	287	.09
WBR	f		935		519	

TOTAL CAPACITY UTILIZATION .69 .71

194 . MacArthur Blvd. SB at University Dr.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	66	.04*	124	.08*
NBT	0	0	0		0	
NBR	1	1600	583	.36	454	.28
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	1527	.33*	1236	.26*
EBR	0	0	68		25	
WBL	2	3200	102	.03*	345	.11*
WBT	3	4800	1014	.21	886	.18
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.32*	NBR	.20*

TOTAL CAPACITY UTILIZATION .72 .65

195 . SR-73 SB Ramps at University Dr.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	987	.62*	682	.43*
SBT	0	0	0		0	
SBR	1	1600	66	.04	237	.15
EBL	0	0	0		0	
EBT	3	4800	600	.13	658	.14
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	687	.14*	733	.15*
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .76 .58

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\noProj\EXE-193\ICU\P30NP-C-NPB02-102809

733 . Irvine Av. at Mesa Dr.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	109	.07	44	.03*
NBT	3	4800	1016	.21*	608	.13
NBR	d	1600	363	.23	303	.19
SBL	1	1600	26	.02*	29	.02
SBT	3	4800	429	.09	1454	.30*
SBR	d	1600	77	.05	216	.14
EBL	1	1600	137	.09	45	.03*
EBT	1	1600	281	.18*	220	.14
EBR	1	1600	46	.03	138	.09
WBL	2	3200	264	.08*	552	.17
WBT	1	1600	104	.07	552	.35*
WBR	1	1600	27	.02	39	.02
Right Turn Adjustment			NBR	.02*		

TOTAL CAPACITY UTILIZATION .51 .71

734 . Irvine Av. at University Dr.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	173	.11	180	.11*
NBT	3	4800	1230	.26*	646	.13
NBR	1	1600	1	.00	12	.01
SBL	1	1600	107	.07*	51	.03
SBT	3	4800	533	.11	1597	.33*
SBR	1	1600	147	.09	442	.28
EBL	1.5		331	{.12}*	254	{.10}*
EBT	0.5	3200	62	.12	60	.10
EBR	1	1600	134	.08	198	.12
WBL	1	1600	13	.01	31	.02
WBT	1	1600	30	.02*	71	.04*
WBR	d	1600	30	.02	49	.03

TOTAL CAPACITY UTILIZATION .47 .58

741 . Jamboree Av. at San Joaquin Hills Rd.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	41	.03	71	.04
NBT	3	4800	1140	.24*	1599	.33*
NBR	f		129		138	
SBL	2	3200	668	.21*	457	.14*
SBT	3	4800	1225	.26	1847	.38
SBR	f		37		125	
EBL	1.5		258	.08*	161	.05*
EBT	1.5	4800	33	.02	35	.02
EBR	f		59		56	
WBL	2	3200	126	.04	197	.06
WBT	1	1600	12	.01*	44	.03*
WBR	1	1600	42	.03	71	.04
Right Turn Adjustment			WBR	.02*	WBR	.01*

TOTAL CAPACITY UTILIZATION .56 .56

742 . MacArthur Blvd. at San Joaquin Hills Rd.

P2030 Constraint No Project (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	140	.04*	110	.03*
NBT	4	6400	1301	.24	1877	.30
NBR	0	0	207		29	
SBL	3	4800	268	.06	528	.11
SBT	3	4800	1786	.37*	1875	.39*
SBR	f		470		231	
EBL	3	4800	444	.09*	522	.11*
EBT	3	4800	114	.03	374	.11
EBR	0	0	42		164	
WBL	1	1600	12	.01	54	.03
WBT	2	3200	405	.13*	329	.10*
WBR	f		491		566	

TOTAL CAPACITY UTILIZATION .63 .63

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\noProj\EXE-193\ICU\P30NP-C-SAN01-102809

4 . SR-55 SB Ramps at Edinger Av.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		430		340	{.11}*
NBT	0.5	3400	44	.14*	39	.11
NBR	2	3400	506	.15	190	.06
SBL	1	1700	78	.05*	142	.08
SBT	1	1700	22	.03	78	.08*
SBR	0	0	31		60	
EBL	1	1700	46	.03	56	.03
EBT	3	5100	1896	.37*	1786	.35*
EBR	f		277		328	
WBL	2	3400	442	.13*	467	.14*
WBT	3	5100	1779	.37	1587	.33
WBR	0	0	101		94	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .73

5 . Hotel Terrace Dr. at Dyer Rd.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		187	{.06}*	183	{.06}*
NBT	0.5	3400	12	.06	11	.06
NBR	2	3400	391	.12	86	.03
SBL	0.5		115		100	
SBT	1.5	3400	183	.09*	493	.17*
SBR	1	1700	42	.02	157	.09
EBL	1	1700	60	.04	128	.08
EBT	3	5100	1234	.24*	964	.19*
EBR	1	1700	337	.20	158	.09
WBL	2	3400	510	.15*	649	.19*
WBT	3	5100	910	.18	1071	.21
WBR	1	1700	188	.11	50	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .66

6 . Grand Av. at Dyer Rd.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	612	.18*	695	.20*
SBT	0	0	0		0	
SBR	1	1700	429	.25	325	.19
EBL	2	3400	185	.05	322	.09*
EBT	3	5100	1558	.31*	928	.18
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5100	1201	.24	1532	.30*
WBR	f		725		419	
Right Turn Adjustment			SBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .56 .64

7 . SR-55 NB Ramps at Dyer Rd.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		919	{.33}*	272	.08*
NBT	0	5100	0	.33	0	
NBR	1.5		762		89	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	2418	.47*	1111	.22
EBR	f		550		1020	
WBL	0	0	0		0	
WBT	2.5	5100	1041	.27	1778	.52*
WBR	0.5		330		1350	.79
Right Turn Adjustment					WBR	.21*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .85 .86

8 . SR-55 SB Ramps at MacArthur Blvd.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	1076	.32*	308	.09*
SBT	0	0	0		0	
SBR	2	3400	1021	.30	750	.22
EBL	0	0	0		0	
EBT	2	3400	1314	.39*	1177	.35*
EBR	f		760		1044	
WBL	0	0	0		0	
WBT	3	5100	1289	.25	1739	.34
WBR	f		170		803	
Right Turn Adjustment					SBR	.12*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .61

9 . SR-55 NB Ramps at MacArthur Blvd.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1103	.32*	730	.21*
NBT	0	0	0		0	
NBR	f		633		223	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	1567	.46*	787	.23
EBR	f		630		790	
WBL	0	0	0		0	
WBT	3	5100	597	.12	1740	.34*
WBR	f		250		1210	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .83 .60

28 . Pullman St. at Warner Av.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		66		161	
NBT	0.5	1700	17	.05*	10	.10*
NBR	1	1700	70	.04	100	.06
SBL	0	0	46	{.03}*	124	{.07}*
SBT	2	3400	19	.02	35	.06
SBR	0	0	16		152	.09
EBL	1	1700	87	.05	49	.03*
EBT	3	5100	1924	.41*	1446	.29
EBR	0	0	183		58	
WBL	1	1700	48	.03*	57	.03
WBT	3	5100	1199	.25	1947	.39*
WBR	0	0	65		31	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .64

29 . Pullman St. at Barranca Pkwy.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	121	.04*	657	.19*
NBT	1	1700	19	.03	16	.05
NBR	0	0	30		74	
SBL	1	1700	41	.02	29	.02
SBT	0.5	3400	18	{.01}*	8	{.08}*
SBR	1.5		101		387	
EBL	1	1700	373	.22	185	.11*
EBT	3	5100	1595	.40*	957	.20
EBR	0	0	437		78	
WBL	1	1700	43	.03*	54	.03
WBT	3	5100	967	.19	1946	.39*
WBR	0	0	24		29	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .82

543 . Bristol St. at Segerstrom Av.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	93	.05*	221	.13
NBT	3	5100	797	.16	1333	.26*
NBR	d	1700	221	.13	368	.22
SBL	1	1700	257	.15	181	.11*
SBT	3	5100	1247	.27*	961	.21
SBR	0	0	120		111	
EBL	1	1700	248	.15	255	.15*
EBT	2	3400	1142	.36*	951	.36
EBR	0	0	91		286	
WBL	1	1700	202	.12*	264	.16
WBT	2	3400	797	.26	1168	.38*
WBR	0	0	95		122	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .85 .95

544 . Bristol St. at MacArthur Blvd.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	113	.03*	465	.14*
NBT	3	5100	810	.16	1591	.31
NBR	1	1700	136	.08	335	.20
SBL	2	3400	254	.07	279	.08
SBT	3	5100	1443	.31*	1161	.26*
SBR	0	0	142		180	
EBL	2	3400	205	.06	358	.11*
EBT	3	5100	1176	.23*	727	.14
EBR	1	1700	158	.09	165	.10
WBL	2	3400	177	.05*	379	.11
WBT	3	5100	967	.19	1402	.27*
WBR	1	1700	146	.09	269	.16
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .83

719 . Flower St. at Segerstrom Av.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	103	.06	120	.07*
NBT	2	3400	609	.21*	451	.18
NBR	0	0	110		158	
SBL	1	1700	148	.09*	172	.10
SBT	2	3400	465	.16	755	.25*
SBR	0	0	89		91	
EBL	1	1700	132	.08	128	.08*
EBT	2	3400	1262	.46*	812	.28
EBR	0	0	301		148	
WBL	1	1700	103	.06*	58	.03
WBT	2	3400	868	.28	1292	.41*
WBR	0	0	79		102	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.87		.86

720 . Flower St. at MacArthur Blvd.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	83	.05	33	.02
NBT	2	3400	444	.20*	572	.19*
NBR	0	0	243		59	
SBL	1	1700	178	.10*	92	.05*
SBT	2	3400	332	.18	294	.12
SBR	0	0	290		119	
EBL	1	1700	167	.10	208	.12*
EBT	3	5100	1287	.26*	979	.21
EBR	0	0	36		73	
WBL	1	1700	42	.02*	93	.05
WBT	3	5100	703	.15	1888	.41*
WBR	0	0	55		200	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.63		.82

723 . Main St. at Dyer Rd.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	87	.05*	217	.13
NBT	2	3400	471	.14	1202	.35*
NBR	1	1700	201	.12	388	.23
SBL	1	1700	199	.12	86	.05*
SBT	3	5100	1098	.25*	616	.16
SBR	0	0	184		180	
EBL	1	1700	244	.14	190	.11*
EBT	2	3400	1240	.36*	666	.20
EBR	1	1700	264	.16	103	.06
WBL	1	1700	178	.10*	202	.12
WBT	2	3400	909	.27	1123	.33*
WBR	1	1700	106	.06	158	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.81		.89

724 . Main St. at Alton Pkwy.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	12	.01*	28	.02
NBT	3	5100	786	.16	1765	.36*
NBR	0	0	44		55	
SBL	1	1700	86	.05	76	.04*
SBT	3	5100	1434	.28*	823	.17
SBR	0	0	7		29	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0.5		36		63	
WBT	0.5	1700	2	.02*	1	.04*
WBR	1	1700	34	.02	67	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.36		.49

725 . Main St. at MacArthur Blvd.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	49	.01	371	.11
NBT	3	5100	309	.06*	786	.15*
NBR	1	1700	202	.12	410	.24
SBL	2	3400	408	.12*	211	.06*
SBT	3	5100	720	.14	457	.09
SBR	1	1700	152	.09	285	.17
EBL	2	3400	286	.08	313	.09*
EBT	3	5100	1500	.29*	629	.12
EBR	1	1700	184	.11	62	.04
WBL	2	3400	306	.09*	251	.07
WBT	3	5100	700	.14	1295	.25*
WBR	1	1700	275	.16	441	.26
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .60

727 . Halladay St. at Dyer Rd.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	46	.03
NBT	1	1700	15	.05*	86	.14*
NBR	0	0	74		156	
SBL	1	1700	242	.14*	178	.10*
SBT	1	1700	52	.12	49	.09
SBR	0	0	146		112	
EBL	1	1700	125	.07	186	.11*
EBT	3	5100	1379	.27*	1126	.22
EBR	0	0	14		8	
WBL	1	1700	124	.07*	62	.04
WBT	3	5100	847	.19	1343	.28*
WBR	0	0	120		98	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .68

728 . Halladay St. E at Alton Pkwy.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0.5		31		49	
SBT	0	1700	0	.11*	0	.08*
SBR	0.5		164		82	
EBL	1	1700	65	.04*	248	.15*
EBT	1	1700	49	.03	33	.02
EBR	0	0	0		0	
WBL	1	1700	0	.00	0	.00
WBT	1	1700	16	.01*	51	.03*
WBR	1	1700	35	.02	58	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .21 .31

729 . Halladay St. W at Alton Pkwy.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		1		42	
NBT	0.5	1700	0	.01*	0	.09*
NBR	0		18		107	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	1	1700	106	.09*	169	.10*
EBR	0	0	54		9	
WBL	0.5		93	{.05}*	21	{.01}*
WBT	0.5	1700	78	.10	122	.08
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .20 .25

730 . Grand Av. at Warner Av.

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	143	.08	249	.15
NBT	3	5100	575	.17*	600	.15*
NBR	0	0	312	.18	180	
SBL	1	1700	370	.22*	283	.17*
SBT	3	5100	497	.14	477	.14
SBR	0	0	242		300	.18
EBL	2	3400	472	.14	458	.13*
EBT	3	5100	1512	.30*	958	.19
EBR	1	1700	197	.12	165	.10
WBL	2	3400	177	.05*	239	.07
WBT	2	3400	706	.21	1424	.42*
WBR	1	1700	285	.17	475	.28
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .79 .92

731 . Grand Av. at SR-55 SB Ramps

P2030 Constraint No Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	901	.26*	730	.21*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	605	.12	710	.14
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	445	.26*	330	.19*
WBT	0	0	0		0	
WBR	1	1700	349	.21	240	.14
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .45

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\noProj\EXE-193\ICU\P30NP-C-TUS01-102809

3 . Newport Av. at Edinger Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	389	.11*	624	.18*
NBT	3	5100	211	.04	743	.15
NBR	d	1700	101	.06	94	.06
SBL	2	3400	183	.05	47	.01
SBT	3	5100	867	.17*	405	.08*
SBR	1	1700	742	.44	319	.19
EBL	2	3400	327	.10	728	.21*
EBT	3	5100	1436	.28*	801	.16
EBR	1	1700	728	.43	767	.45
WBL	1	1700	165	.10*	191	.11
WBT	3	5100	1269	.25	1341	.26*
WBR	f		71		181	
Right Turn Adjustment		Multi	.21*			
Clearance Interval			.05*			.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .92 .78

14 . Walnut Av. at McFadden St.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	386	.11*	618	.18*
NBT	0	0	0		0	
NBR	1	1700	20	.01	109	.06
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	373	.22*	521	.30*
EBR	0	0	654	.38	502	
WBL	1	1700	83	.05*	58	.03*
WBT	2	3400	723	.21	432	.13
WBR	0	0	0		0	
Right Turn Adjustment		EBR	.08*			
Clearance Interval			.05*			.05*

TOTAL CAPACITY UTILIZATION .51 .56

18 . Newport Av. at Bryan Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	77	.05*	132	.08
NBT	3	5100	715	.14	1536	.31*
NBR	0	0	20		35	
SBL	1	1700	71	.04	129	.08*
SBT	3	5100	2199	.44*	1262	.25
SBR	0	0	47		33	
EBL	1	1700	12	.01*	47	.03*
EBT	1	1700	23	.01	56	.03
EBR	1	1700	76	.04	179	.11
WBL	1	1700	34	.02	49	.03
WBT	1	1700	53	.03*	65	.04*
WBR	1	1700	214	.13	407	.24
Right Turn Adjustment					WBR	.14*
Clearance Interval			.05*			.05*

TOTAL CAPACITY UTILIZATION .58 .65

19 . Newport Av. at Main St.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	124	.07*	204	.12*
NBT	3	5100	565	.12	1399	.30
NBR	0	0	71		120	
SBL	1	1700	177	.10	100	.06
SBT	3	5100	524	.15*	1091	.25*
SBR	0	0	269	.16	195	
EBL	1	1700	101	.06	221	.13*
EBT	2	3400	242	.07*	421	.12
EBR	1	1700	307	.18	227	.13
WBL	1	1700	319	.19*	233	.14
WBT	2	3400	317	.09	692	.20*
WBR	1	1700	15	.01	43	.03
Right Turn Adjustment		EBR	.06*			
Clearance Interval			.05*			.05*

TOTAL CAPACITY UTILIZATION .59 .75

20 . Newport Av. at El Camino Real

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	215	.13*	236	.14
NBT	3	5100	769	.17	1283	.29*
NBR	0	0	117		176	
SBL	1	1700	124	.07	194	.11*
SBT	3	5100	1895	.38*	1055	.22
SBR	0	0	30		88	
EBL	1	1700	16	.01	53	.03
EBT	1	1700	129	.08*	250	.15*
EBR	1	1700	373	.22	241	.14
WBL	1	1700	172	.10*	234	.14*
WBT	2	3400	235	.10	397	.16
WBR	0	0	95		144	
Right Turn Adjustment			EBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .78 .74

21 . Newport Av. at I-5 NB Ramps

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	208	.12*	316	.19*
NBT	3	5100	1200	.24	2030	.40
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1970	.49*	1290	.34*
SBR	0	0	552		454	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .58

22 . Newport Av. at Nisson Rd.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1063	.22	1781	.37*
NBR	0	0	84		95	
SBL	1	1700	173	.10	248	.15*
SBT	3	5100	1751	.34*	1126	.22
SBR	0	0	0		0	
EBL	1.5		279		371	
EBT	0.5	3400	63	.10*	50	.12*
EBR	f		436		579	
WBL	1	1700	73	.04*	77	.05*
WBT	0	0	0		0	
WBR	1	1700	157	.09	173	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .74

23 . Newport Av. at McFadden St.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	42	.02*	66	.04*
NBT	3	5100	892	.18	1489	.30
NBR	0	0	11		16	
SBL	1	1700	18	.01	40	.02
SBT	3	5100	1763	.52*	1087	.29*
SBR	0	0	908	.53	417	
EBL	2	3400	308	.09*	536	.16*
EBT	0	0	1		9	
EBR	1	1700	67	.04	36	.02
WBL	0	0	0		0	
WBT	1	1700	0	.00*	0	.00*
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .54

24 . Newport Av. at Walnut Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	44	.03	153	.09
NBT	3	5100	703	.16*	1079	.24*
NBR	0	0	94		149	
SBL	1	1700	738	.43*	538	.32*
SBT	3	5100	1083	.22	680	.15
SBR	0	0	47		60	
EBL	1	1700	122	.07	43	.03*
EBT	2	3400	428	.18*	423	.15
EBR	0	0	170		93	
WBL	1	1700	147	.09*	157	.09
WBT	2	3400	329	.19	497	.29*
WBR	0	0	355	.21	618	.36
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .91 .93

25 . Newport Av. at Sycamore Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	212	.12*	374	.22*
NBT	3	5100	395	.08	1036	.20
NBR	d	1700	109	.06	160	.09
SBL	1	1700	212	.12	236	.14
SBT	3	5100	1302	.26*	667	.13*
SBR	d	1700	91	.05	118	.07
EBL	1	1700	108	.06	93	.05*
EBT	2	3400	20	.01*	18	.01
EBR	0	0	62	.04	39	.02
WBL	1	1700	316	.19*	178	.10
WBT	2	3400	146	.09	338	.19*
WBR	0	0	187	.11	305	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .63 .64

27 . Del Amo Av. at Edinger Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		95	{.03}*	223	{.07}*
NBT	0.5	3400	4	.03	0	.07
NBR	1	1700	249	.15	247	.15
SBL	0	0	0		0	
SBT	1	1700	0	.00*	0	.00*
SBR	0	0	0		0	
EBL	1	1700	13	.01	7	.00
EBT	3	5100	1466	.29*	850	.17
EBR	d	1700	193	.11	76	.04
WBL	2	3400	178	.05*	256	.08
WBT	3	5100	1419	.28	1538	.30*
WBR	d	1700	0	.00	0	.00
Right Turn Adjustment		NBR		.07*		
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for NBR						

TOTAL CAPACITY UTILIZATION .49 .42

35 . Red Hill Av. at Bryan Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	156	.09*	215	.13
NBT	3	5100	377	.10	792	.17*
NBR	0	0	139		70	
SBL	1	1700	102	.06	99	.06*
SBT	3	5100	834	.19*	427	.10
SBR	0	0	113		71	
EBL	1	1700	73	.04	67	.04*
EBT	2	3400	599	.21*	499	.19
EBR	0	0	120		158	
WBL	1	1700	96	.06*	92	.05
WBT	2	3400	641	.22	834	.29*
WBR	0	0	110		148	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .61

36 . Red Hill Av. at El Camino Real

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	320	.09*	434	.13
NBT	3	5100	600	.12	810	.16*
NBR	1	1700	161	.09	301	.18
SBL	1	1700	89	.05	252	.15*
SBT	3	5100	1261	.26*	588	.13
SBR	0	0	68		63	
EBL	1	1700	112	.07	33	.02
EBT	1.5	5100	293	{.09}*	957	.28*
EBR	1.5		295		157	
WBL	1.5		327	{.13}*	325	.19*
WBT	1.5	5100	267	.13	1023	.35
WBR	0		55		157	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.62		.83

37 . Red Hill Av. at Nisson Rd.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	21	.01*	16	.01
NBT	4	6800	806	.12	1466	.22*
NBR	0	0	41		53	
SBL	1	1700	109	.06	181	.11*
SBT	3	5100	1413	.28*	719	.14
SBR	d	1700	102	.06	45	.03
EBL	1	1700	194	.11*	215	.13*
EBT	1	1700	70	.06	186	.13
EBR	0	0	39		29	
WBL	1	1700	48	.03	72	.04
WBT	1	1700	87	.19*	109	.18*
WBR	0	0	230		199	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.64		.69

38 . Red Hill Av. at Walnut Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	132	.08*	338	.20
NBT	3	5100	382	.11	1649	.36*
NBR	0	0	156		192	
SBL	1	1700	99	.06	123	.07*
SBT	3	5100	1288	.28*	489	.13
SBR	0	0	124		198	
EBL	1	1700	153	.09	232	.14*
EBT	2	3400	515	.28*	416	.16
EBR	0	0	422		141	
WBL	2	3400	248	.07*	228	.07
WBT	2	3400	421	.16	625	.22*
WBR	0	0	131		128	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.76		.84

39 . Red Hill Av. at Sycamore Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	109	.06*	529	.31*
NBT	3	5100	609	.13	1845	.38
NBR	0	0	32		98	
SBL	1	1700	53	.03	112	.07
SBT	3	5100	1725	.38*	631	.17*
SBR	0	0	194		239	
EBL	1	1700	80	.05*	92	.05*
EBT	1	1700	25	.01	40	.02
EBR	1	1700	147	.09	146	.09
WBL	1	1700	78	.05	43	.03
WBT	1	1700	158	.09*	42	.02*
WBR	1	1700	61	.04	53	.03
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.63		.60

40 . Red Hill Av. at Edinger Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	66	.02*	206	.06
NBT	3	5100	234	.05	1621	.32*
NBR	1	1700	192	.11	474	.28
SBL	2	3400	302	.09	176	.05*
SBT	3	5100	1314	.26*	377	.07
SBR	1	1700	292	.17	197	.12
EBL	2	3400	223	.07	289	.09*
EBT	3	5100	1090	.21*	746	.15
EBR	1	1700	233	.14	96	.06
WBL	2	3400	631	.19*	230	.07
WBT	3	5100	1185	.23	1085	.21*
WBR	1	1700	148	.09	536	.32
Right Turn Adjustment					WBR	.06*
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for WBR EBR						

TOTAL CAPACITY UTILIZATION .73 .78

41 . Red Hill Av. at Warner Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	516	.15*	766	.23
NBT	3	5100	502	.10	1902	.37*
NBR	1	1700	133	.08	203	.12
SBL	2	3400	108	.03	142	.04*
SBT	3	5100	1533	.30*	650	.13
SBR	1	1700	646	.38	418	.25
EBL	2	3400	273	.08*	313	.09*
EBT	3	5100	1249	.24	1362	.27
EBR	1	1700	428	.25	333	.20
WBL	2	3400	81	.02	135	.04
WBT	3	5100	1267	.25*	1359	.27*
WBR	1	1700	135	.08	199	.12
Right Turn Adjustment				SBR .02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .85 .82

55 . Browning Av. at Bryan Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	51	.03	86	.05
NBT	2	3400	332	.10*	648	.19*
NBR	d	1700	300	.18	86	.05
SBL	1	1700	115	.07*	62	.04*
SBT	2	3400	197	.06	120	.04
SBR	d	1700	50	.03	41	.02
EBL	1	1700	44	.03	25	.01
EBT	2	3400	825	.24*	1042	.31*
EBR	d	1700	76	.04	61	.04
WBL	1	1700	158	.09*	129	.08*
WBT	2	3400	179	.05	303	.09
WBR	1	1700	155	.09	147	.09
Right Turn Adjustment				NBR .01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .56 .67

56 . Browning Av. at El Camino Real

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	57	.03	127	.07
NBT	2	3400	235	.09*	419	.15*
NBR	0	0	67		103	
SBL	1	1700	124	.07*	66	.04*
SBT	2	3400	331	.10	177	.05
SBR	1	1700	105	.06	78	.05
EBL	1	1700	82	.05	93	.05*
EBT	2	3400	221	.08*	206	.08
EBR	0	0	66		61	
WBL	1	1700	75	.04*	118	.07
WBT	2	3400	210	.06	485	.14*
WBR	1	1700	95	.06	178	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .33 .43

58 . Browning Av. at Walnut Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	210	.12*	114	.07*
SBT	0	0	0		0	
SBR	1	1700	160	.09	75	.04
EBL	1	1700	123	.07*	77	.05*
EBT	2	3400	920	.27	625	.18
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	590	.21*	1120	.45*
WBR	0	0	107		409	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .62

92 . Tustin Ranch Rd. at Bryan Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	135	.08*	506	.30
NBT	3	5100	507	.10	2027	.40*
NBR	1	1700	80	.05	137	.08
SBL	1	1700	181	.11	108	.06*
SBT	3	5100	2145	.42*	668	.13
SBR	1	1700	162	.10	203	.12
EBL	2	3400	87	.03	135	.04*
EBT	2	3400	619	.18*	716	.21
EBR	1	1700	374	.22	177	.10
WBL	2	3400	281	.08*	186	.05
WBT	2	3400	283	.08	1053	.31*
WBR	d	1700	66	.04	201	.12
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR EBR

TOTAL CAPACITY UTILIZATION .81 .86

93 . Tustin Ranch Rd. at El Camino Real

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	119	.04*	542	.16
NBT	3	5100	431	.08	2256	.44*
NBR	d	1700	122	.07	300	.18
SBL	2	3400	109	.03	168	.05*
SBT	3	5100	2544	.50*	820	.16
SBR	d	1700	154	.09	72	.04
EBL	1	1700	169	.10	101	.06*
EBT	2	3400	199	.12*	352	.16
EBR	0	0	532	.31	197	
WBL	1	1700	263	.15*	223	.13
WBT	2	3400	207	.09	476	.24*
WBR	0	0	100		353	
Right Turn Adjustment		EBR		.16*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION 1.02 .84

94 . Tustin Ranch Rd. at I-5 NB Ramps

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	328	.10*	661	.19*
NBT	3	5100	913	.18	1572	.31
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2478	.49*	986	.19*
SBR	f		42		459	
EBL	1.5		147	.09*	318	.09*
EBT	0	5100	0		0	
EBR	1.5		432	.13	284	{.02}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .73 .52

95 . Tustin Ranch Rd. at I-5 SB Ramps

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	166	.05*	248	.07
NBT	3	5100	941	.18	1784	.35*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2334	.46*	947	.19
SBR	d	1700	590	.35	330	.19
EBL	1.5		713	{.29}*	589	.17*
EBT	0	5100	0	{.29}	0	
EBR	1.5		845		492	{.17}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .85 .57

96 . Tustin Ranch Rd. at Walnut Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	66	.02*	261	.08
NBT	3	5100	480	.09	1365	.27*
NBR	d	1700	176	.10	334	.20
SBL	2	3400	847	.25	304	.09*
SBT	3	5100	1680	.33*	681	.13
SBR	d	1700	307	.18	226	.13
EBL	2	3400	273	.08	212	.06*
EBT	2	3400	937	.28*	466	.14
EBR	d	1700	202	.12	112	.07
WBL	2	3400	368	.11*	251	.07
WBT	2	3400	618	.18	728	.21*
WBR	d	1700	497	.29	442	.26
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .79 .68

109 . Myford Rd. at Bryan Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	62	.04*	170	.10*
NBT	2	3400	72	.03	383	.14
NBR	0	0	16		109	
SBL	1	1700	90	.05	40	.02
SBT	2	3400	342	.13*	117	.06*
SBR	0	0	107		84	
EBL	1	1700	81	.05*	76	.04*
EBT	2	3400	657	.19	641	.19
EBR	d	1700	111	.07	88	.05
WBL	1	1700	179	.11	95	.06
WBT	2	3400	955	.28*	1016	.30*
WBR	d	1700	37	.02	72	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .55

110 . Myford Rd. at El Camino Real

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	46	.03	114	.07
NBT	2	3400	79	.03*	218	.12*
NBR	0	0	37		200	
SBL	1	1700	202	.12*	121	.07*
SBT	2	3400	143	.08	52	.03
SBR	0	0	272	.16	138	.08
EBL	1	1700	16	.01	240	.14*
EBT	2	3400	141	.08*	509	.18
EBR	0	0	238	.14	103	
WBL	1	1700	159	.09*	115	.07
WBT	2	3400	252	.08	598	.23*
WBR	0	0	34		182	
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .38 .61

111 . Franklin Av. at Walnut Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	96	.06*	245	.14*
NBT	2	3400	8	.00	11	.01
NBR	0	0	17	.01	14	.01
SBL	1	1700	38	.02	65	.04
SBT	2	3400	9	.01*	9	.01*
SBR	0	0	164	.10	457	.27
EBL	1	1700	413	.24*	239	.14*
EBT	2	3400	1055	.31	722	.21
EBR	d	1700	332	.20	130	.08
WBL	1	1700	69	.04	13	.01
WBT	2	3400	690	.20*	1640	.48*
WBR	d	1700	149	.09	74	.04
Right Turn Adjustment					SBR	.15*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.56		.97

445 . Tustin Ranch Rd. at Warner Av. N.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2.5	6800	323	.10*	991	{.26}*
NBR	1.5		617	.18	1014	
SBL	2	3400	543	.16*	366	.11*
SBT	3	5100	1227	.24	556	.11
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2.5		913	.18*	594	
WBT	0	6800	0		0	{.14}*
WBR	1.5		307	{.06}	529	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .49 .56

446 . Tustin Ranch Rd. at Warner Av. S.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	277	.08*	412	.12
NBT	3	5100	393	.08	867	.17*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	614	.12*	255	.05
SBR	2	3400	1528	.45	898	.26
EBL	2	3400	549	.16*	1133	.33*
EBT	0	0	0		0	
EBR	1	1700	419	.25	585	.34
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			Multi	.24*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .55

447 . Armstrong Av. at Valencia Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	97	.03*	287	.08
NBT	1	1700	48	.03	299	.18*
NBR	d	1700	25	.01	168	.10
SBL	1	1700	34	.02	44	.03*
SBT	1	1700	348	.28*	126	.12
SBR	0	0	121		72	
EBL	1	1700	47	.03*	89	.05*
EBT	2	3400	221	.07	459	.14
EBR	1	1700	265	.16	156	.09
WBL	2	3400	147	.04	69	.02
WBT	2	3400	461	.14*	352	.12*
WBR	0	0	25		42	
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .43

448 . Armstrong Av. at Warner Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	68	.02	177	.05
NBT	2	3400	22	.01*	99	.05*
NBR	0	0	31	.02	65	
SBL	1	1700	63	.04*	42	.02*
SBT	2	3400	68	.02	47	.01
SBR	1	1700	140	.08	112	.07
EBL	1	1700	99	.06*	205	.12*
EBT	3	5100	1181	.23	1243	.24
EBR	1	1700	133	.08	143	.08
WBL	1	1700	69	.04	60	.04
WBT	3	5100	1217	.24*	1251	.25*
WBR	1	1700	39	.02	76	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .40 .49

453 . Red Hill Ave. at Valencia Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	156	.05*	149	.04
NBT	3	5100	482	.09	2157	.42*
NBR	1	1700	101	.06	195	.11
SBL	2	3400	96	.03	117	.03*
SBT	3	5100	2005	.39*	608	.12
SBR	1	1700	220	.13	59	.03
EBL	1	1700	18	.01*	148	.09*
EBT	2	3400	451	.13	483	.14
EBR	1	1700	22	.01	73	.04
WBL	2	3400	133	.04	111	.03
WBT	2	3400	544	.16*	606	.18*
WBR	1	1700	78	.05	134	.08
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .77

454 . Tustin Ranch Rd. at Valencia Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	217	.06*	333	.10
NBT	3	5100	310	.06	1174	.23*
NBR	1	1700	6	.00	62	.04
SBL	2	3400	59	.02	163	.05*
SBT	3	5100	1701	.33*	715	.14
SBR	1	1700	566	.33	219	.13
EBL	2	3400	200	.06*	690	.20*
EBT	1	1700	5	.00	55	.03
EBR	1	1700	105	.06	159	.09
WBL	1	1700	74	.04	26	.02
WBT	2	3400	147	.04*	48	.01*
WBR	1	1700	70	.04	56	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .54

455 . North Loop Rd. at Edinger Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	134	.08*	208	.12*
NBT	1	1700	1	.00	1	.00
NBR	1	1700	21	.01	25	.01
SBL	1	1700	1	.00	1	.00
SBT	1	1700	1	.00*	1	.00*
SBR	1	1700	1	.00	1	.00
EBL	1	1700	1	.00	1	.00
EBT	3	5100	519	.10*	165	.03*
EBR	0	0	0		0	
WBL	1	1700	190	.11*	220	.13*
WBT	3	5100	206	.04	352	.07
WBR	1	1700	1	.00	1	.00
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .34 .33

456 . North Loop Rd. at Valencia Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	186	.11*	72	.04*
NBT	1	1700	83	.05	137	.08
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	1	1700	143	.08*	141	.08*
SBR	1	1700	59	.03	40	.02
EBL	1	1700	9	.01*	86	.05*
EBT	0	0	0		0	
EBR	1	1700	51	.03	164	.10
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					EBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .25 .24

457 . North Loop Rd. at Moffett Dr.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	41	.01	65	.02*
NBR	1	1700	9	.01	95	.06
SBL	1	1700	31	.02	79	.05*
SBT	2	3400	109	.03*	81	.02
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	91	.05*	42	.02*
WBT	0	0	0		0	
WBR	1	1700	109	.06	28	.02
Right Turn Adjustment					NBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .13 .16

478 . Red Hill Ave. at I-5 NB Ramps

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	480	.28*	456	.27*
NBT	3	5100	820	.16	1044	.20
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1300	.25*	731	.14*
SBR	1	1700	601	.35	309	.18
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		499		387	
WBT	0.5	3400	3	.15*	47	.13*
WBR	1	1700	358	.21	496	.29
Right Turn Adjustment			SBR	.10*	SBR	.04*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .83 .63

479 . Red Hill Ave. at I-5 SB Ramps

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1063	.16*	1092	.16*
NBR	1	1700	590	.35	523	.31
SBL	1	1700	471	.28*	367	.22*
SBT	4	6800	1257	.18	738	.11
SBR	0	0	0		0	
EBL	0.5		243	{.14}*	408	{.24}*
EBT	0.5	1700	0	.14	0	.24
EBR	1	1700	437	.26	332	.20
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.19*	NBR	.15*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .82 .82

480 . Tustin Ranch Rd. at Edinger Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	18	.01*	111	.07*
NBT	0	0	0		0	
NBR	1	1700	3	.00	5	.00
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	587	.12*	187	.04
EBR	1	1700	194	.11	171	.10
WBL	2	3400	36	.01*	41	.01
WBT	3	5100	332	.07	545	.11*
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .19 .23

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\noProj\EXE-193\ICU\P30NP-C-TUS02-102809

732 . Newport Av. at SR-55 NB Ramps

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	204	.06*	515	.15*
NBT	3	5100	304	.09	965	.22
NBR	0	0	206	.12	168	
SBL	1	1700	0	.00	47	.03
SBT	2	3400	1009	.30*	422	.12*
SBR	1	1700	193	.11	909	.53
EBL	2	3400	440	.13	500	.15*
EBT	1.5	3400	361	.16*	75	.04
EBR	0.5		185		69	
WBL	1	1700	70	.04*	190	.11
WBT	2	3400	85	.03	335	.12*
WBR	0	0	5		65	
Right Turn Adjustment					SBR	.30*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .89

739 . Newport Av. at Mitchell Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	18	.01*	17	.01
NBT	3	5100	1012	.24	1570	.36*
NBR	0	0	234		251	
SBL	1	1700	95	.06	180	.11*
SBT	3	5100	2249	.46*	1309	.29
SBR	0	0	74		152	
EBL	1	1700	123	.07	98	.06*
EBT	1	1700	61	.05*	49	.04
EBR	0	0	23		22	
WBL	1	1700	178	.10*	189	.11
WBT	1	1700	48	.07	71	.12*
WBR	0	0	66		141	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .70

740 . Red Hill Ave. at Mitchell Av.

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	41	.02	159	.09
NBT	3	5100	1543	.33*	1278	.29*
NBR	0	0	139		180	
SBL	1	1700	308	.18*	176	.10*
SBT	3	5100	1140	.25	767	.17
SBR	0	0	154		85	
EBL	0.5		34	{.02}*	133	
EBT	0.5	1700	42	.04	184	.19*
EBR	1	1700	15	.01	63	.04
WBL	0.5		35		20	{.01}*
WBT	0.5	1700	35	.04*	117	.08
WBR	1	1700	103	.06	109	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .64

743 . Newport Avenue at Valencia

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	0	.00
NBT	1	1700	155	.09	637	.37*
NBR	d	1700	23	.01	55	.03
SBL	2	3400	864	.25	510	.15*
SBT	1	1700	838	.49*	364	.21
SBR	d	1700	0	.00	5	.00
EBL	1	1700	4	.00	5	.00
EBT	1	1700	5	.00*	4	.00*
EBR	d	1700	1	.00	8	.00
WBL	1	1700	85	.05*	56	.03*
WBT	1	1700	10	.01	5	.00
WBR	2	3400	574	.17	908	.27
Right Turn Adjustment					WBR	.13*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .73

745 . Tustin Ranch Road at Park Avenue

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	117	.03*	64	.02*
NBT	3	5100	360	.07	465	.09
NBR	1	1700	17	.01	12	.01
SBL	2	3400	62	.02	44	.01
SBT	3	5100	527	.10*	558	.11*
SBR	1	1700	434	.26	227	.13
EBL	2	3400	187	.06*	587	.17*
EBT	2	3400	82	.02	144	.04
EBR	1	1700	73	.04	200	.12
WBL	1	1700	50	.03	73	.04
WBT	1	1700	369	.22*	269	.16*
WBR	1	1700	123	.07	218	.13
Right Turn Adjustment			SBR	.11*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.57		.51

746 . Kensington Park Drive at Edinger Avenue

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	68	.02*	201	.06*
NBT	0	0	0		0	
NBR	1	1700	43	.03	170	.10
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1837	.36	2410	.47*
EBR	1	1700	249	.15	100	.06
WBL	2	3400	221	.07	70	.02*
WBT	3	5100	2592	.51*	2009	.39
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.58		.62

747 . Kensington Park Drive at Valencia Avenue

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	34	{.02}*	74	{.04}*
NBT	0	0	26		123	
NBR	0	0	40		194	
SBL	2	3400	60	.02	37	.01
SBT	0	0	224		29	
SBR	2	3400	55	.02	14	.00
EBL	2	3400	13	.00	40	.01
EBT	2	3400	191	.08	580	.19*
EBR	0	0	77		52	
WBL	0	0	253		89	{.05}*
WBT	2	3400	544	.23*	372	.14
WBR	1	1700	42	.02	67	.04
Right Turn Adjustment			SBR	.02*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.32		.33

748 . Armstrong Avenue at A Street

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	120	.07*	99	.06*
NBT	2	3400	86	.03	190	.06
NBR	d	1700	95	.06	111	.07
SBL	1	1700	95	.06	72	.04
SBT	2	3400	152	.04*	123	.04*
SBR	d	1700	123	.07	65	.04
EBL	2	3400	51	.02	117	.03
EBT	1	1700	500	.29*	620	.36*
EBR	d	1700	88	.05	114	.07
WBL	1	1700	69	.04*	116	.07*
WBT	1	1700	508	.30	558	.33
WBR	d	1700	44	.03	117	.07
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.50		.58

749 . Park Avenue at A Street

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	216	.06*	485	.14*
NBT	1	1700	29	.02	50	.03
NBR	d	1700	126	.07	505	.30
SBL	1	1700	2	.00	6	.00
SBT	1	1700	44	.03*	48	.03*
SBR	d	1700	4	.00	6	.00
EBL	1	1700	6	.00	6	.00
EBT	2	3400	222	.07*	429	.13*
EBR	d	1700	476	.28	365	.21
WBL	1	1700	510	.30*	267	.16*
WBT	2	3400	410	.12	299	.09
WBR	d	1700	5	.00	4	.00
Right Turn Adjustment			EBR	.16*	NBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.67		.52

750 . Legacy Road at Warner Avenue

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	55	.03	86	.05
NBT	2	3400	91	.03*	102	.03*
NBR	1	1700	24	.01	52	.03
SBL	1	1700	61	.04*	192	.11*
SBT	2	3400	81	.02	83	.02
SBR	1	1700	138	.08	315	.19
EBL	2	3400	348	.10*	229	.07*
EBT	3	5100	815	.16	1060	.21
EBR	1	1700	112	.07	55	.03
WBL	2	3400	77	.02	32	.01
WBT	3	5100	1107	.22*	963	.19*
WBR	1	1700	201	.12	131	.08
Right Turn Adjustment					SBR	.05*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.44		.50

751 . Tustin Ranch Road at Legacy Road

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	95	.03*	77	.02
NBT	3	5100	471	.09	1341	.26*
NBR	1	1700	61	.04	79	.05
SBL	2	3400	88	.03	74	.02*
SBT	3	5100	1619	.32*	766	.15
SBR	1	1700	165	.10	62	.04
EBL	1	1700	28	.02	117	.07*
EBT	2	3400	31	.01*	67	.02
EBR	1	1700	61	.04	76	.04
WBL	1	1700	70	.04*	67	.04
WBT	2	3400	60	.02	50	.01*
WBR	1	1700	31	.02	102	.06
Right Turn Adjustment			EBR	.01*	WBR	.03*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.46		.44

752 . Legacy Road at North Loop Road

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	49	.03*	20	.01*
NBT	2	3400	58	.02	22	.01
NBR	d	1700	13	.01	7	.00
SBL	1	1700	6	.00	21	.01
SBT	2	3400	8	.00*	48	.01*
SBR	d	1700	26	.02	61	.04
EBL	1	1700	21	.01*	44	.03*
EBT	1	1700	42	.02	132	.08
EBR	1	1700	6	.00	33	.02
WBL	1	1700	6	.00	9	.01
WBT	1	1700	181	.11*	108	.06*
WBR	d	1700	23	.01	13	.01
Right Turn Adjustment			SBR	.01*	SBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.21		.17

753 . Tustin Ranch Road at Edinger Avenue Conne

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	591	.12	1856	.36*
NBR	1	1700	4	.00	67	.04
SBL	1	1700	16	.01	43	.03*
SBT	3	5100	2216	.43*	1003	.20
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	104	.03*	97	.03*
WBT	0	0	0		0	
WBR	1	1700	129	.08	114	.07
Right Turn Adjustment					WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.51		.49

754 . Red Hill Ave. at Carnegie

P2030 Constraint No Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	109	.06*	26	.02
NBT	3	5100	598	.12	2387	.47*
NBR	1	1700	304	.18	258	.15
SBL	2	3400	558	.16	287	.08*
SBT	3	5100	1324	.26*	764	.15
SBR	d	1700	121	.07	11	.01
EBL	1	1700	9	.01*	138	.08
EBT	1	1700	101	.06	317	.19*
EBR	1	1700	8	.00	60	.04
WBL	1	1700	135	.08	234	.14*
WBT	0.5	3400	395	.23*	146	{.17}
WBR	1.5		183		521	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.61		.93

Appendix B-6 **Post-2030 Cumulative Baseline With Project ICU Worksheets**

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\wProj\EXE-TEST 193\ICU\P30WP-C-COM01-102909

10 . SR-55 Frontage Rd. SB at Paularino Av.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	788		174	
SBT	2	3200	970	.55*	725	.28*
SBR	1	1600	197	.12	300	.19
EBL	0	0	0		0	
EBT	2	3200	1122	.40*	526	.20*
EBR	0	0	172		108	
WBL	1	1600	118	.07*	306	.19*
WBT	2	3200	233	.07	860	.27
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION 1.02 .67

11 . SR-55 Frontage Rd. NB at Paularino Av.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	128		171	
NBT	2	3200	769	.28*	936	.35*
NBR	d	1600	292	.18	224	.14
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	1	1600	266	.17	166	.10*
EBT	2	3200	1638	.51*	579	.18
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	232	.07	992	.31*
WBR	1	1600	256	.16	633	.40
Right Turn Adjustment					WBR	.09*

TOTAL CAPACITY UTILIZATION .79 .85

12 . SR-55 Frontage Rd. SB at Baker St.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	836	{.52}*	279	
SBT	2	3200	149	.31	383	.21*
SBR	1	1600	215	.13	518	.32
EBL	0	0	0		0	
EBT	1.5	4800	1964	.61*	821	.29*
EBR	1.5		262	.16	551	
WBL	1	1600	99	.06*	357	.22*
WBT	2	3200	495	.15	1412	.44
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.06*

TOTAL CAPACITY UTILIZATION 1.19 .78

13 . SR-55 Frontage Rd. NB at Baker St.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		399	.25	375	.23
NBT	1.5	4800	436	.27*	474	.30*
NBR	0		615	.38	502	.31
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	705	.22	343	.11*
EBT	2	3200	2055	.64*	688	.22
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	271	.08	1435	.45*
WBR	1	1600	188	.12	673	.42
Right Turn Adjustment			NBR	.11*		

TOTAL CAPACITY UTILIZATION 1.02 .86

50 . Red Hill Av. at Paularino Av.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	61	.02*	268	.08*
NBT	2	3200	325	.12	814	.27
NBR	0	0	63		37	
SBL	1	1600	67	.04	13	.01
SBT	2	3200	472	.16*	968	.40*
SBR	0	0	53		320	
EBL	1	1600	154	.10	259	.16*
EBT	2	3200	1325	.48*	211	.10
EBR	0	0	203		120	
WBL	1	1600	77	.05*	113	.07
WBT	2	3200	396	.14	686	.24*
WBR	0	0	41		70	

TOTAL CAPACITY UTILIZATION .71 .88

51 . Red Hill Av. at Baker St.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	196	.06	657	.21*
NBT	2	3200	924	.32*	742	.24
NBR	0	0	92		20	
SBL	1	1600	17	.01*	7	.00
SBT	2	3200	448	.15	825	.39*
SBR	0	0	47		410	
EBL	1.5		694	{.25}*	518	.16*
EBT	1.5	4800	501	.25	173	.11
EBR	1	1600	771	.48	198	.12
WBL	1	1600	11	.01	107	.07
WBT	2	3200	47	.02*	413	.14*
WBR	0	0	13		30	
Right Turn Adjustment			EBR	.08*		

TOTAL CAPACITY UTILIZATION .68 .90

52 . Red Hill Av. at Bristol St.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	124	.04	72	.02
NBT	1.5	4800	545	.17*	186	.06*
NBR	1.5		83	.05	22	
SBL	2	3200	261	.08*	620	.19*
SBT	2	3200	151	.05	632	.20
SBR	1	1600	27	.02	359	.22
EBL	2	3200	338	.11*	178	.06*
EBT	3	4800	796	.17	622	.13
EBR	1	1600	58	.04	90	.06
WBL	2	3200	81	.03	117	.04
WBT	3	4800	489	.10*	1133	.24*
WBR	1	1600	736	.46	371	.23
Right Turn Adjustment			WBR	.30*		

TOTAL CAPACITY UTILIZATION .76 .55

541 . Bear St. at Baker St.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	65	.04	222	.14*
NBT	1	1600	150	.13*	271	.20
NBR	0	0	65		48	
SBL	2	3200	495	.15*	264	.08
SBT	1	1600	244	.15	234	.15*
SBR	2	3200	260	.08	482	.15
EBL	2	3200	432	.14	290	.09*
EBT	2	3200	1290	.46*	751	.27
EBR	0	0	169		122	
WBL	1	1600	67	.04*	74	.05
WBT	3	4800	335	.07	1520	.32*
WBR	1	1600	137	.09	192	.12

TOTAL CAPACITY UTILIZATION .78 .70

542 . Bear St. at Paularino Av.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	102	.06	26	.02
NBT	3	4800	1248	.27*	1918	.44*
NBR	0	0	26		171	
SBL	1	1600	131	.08*	173	.11*
SBT	3	4800	1033	.28	1148	.25
SBR	0	0	299		33	
EBL	1	1600	150	.09*	25	.02
EBT	1	1600	24	.04	6	.03*
EBR	0	0	37		38	
WBL	1	1600	7	.00	136	.09*
WBT	1	1600	22	.01*	21	.01
WBR	1	1600	71	.04	233	.15
TOTAL CAPACITY UTILIZATION				.45		.67

545 . Bristol St. at Sunflower Av.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	3	4800	219	.05*	617	.13
NBT	2.5	6400	980	{.20}	1866	.39*
NBR	1.5		352	{.15}	197	.12
SBL	2	3200	309	.10	184	.06*
SBT	3	4800	1231	.26*	1101	.23
SBR	1	1600	159	.10	275	.17
EBL	2	3200	125	.04	348	.11
EBT	2.5	6400	1279	{.28}*	1159	.24*
EBR	1.5		586		394	{.08}
WBL	2	3200	273	.09*	326	.10*
WBT	4	6400	352	.06	608	.10
WBR	d	1600	215	.13	366	.23
TOTAL CAPACITY UTILIZATION				.68		.79

546 . Bristol St. at Anton Blvd.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	85	.03	487	.15
NBT	4	6400	1230	.19*	2200	.34*
NBR	f		1252		757	
SBL	2	3200	280	.09*	262	.08*
SBT	4	6400	1552	.24	1500	.23
SBR	1	1600	23	.01	55	.03
EBL	1	1600	22	.01	109	.07
EBT	1	1600	62	.04*	92	.06*
EBR	1	1600	16	.01	209	.13
WBL	3	4800	565	.12*	1155	.24*
WBT	1	1600	32	.02	119	.07
WBR	1	1600	180	.11	354	.22
TOTAL CAPACITY UTILIZATION				.44		.72

547 . Bristol St. at Paularino Av.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	31	.01	108	.03*
NBT	4	6400	1173	.20*	1554	.26
NBR	0	0	109		115	
SBL	2	3200	568	.18*	339	.11
SBT	3	4800	1158	.25	1782	.39*
SBR	0	0	30		110	
EBL	1	1600	222	.14	139	.09*
EBT	1	1600	393	.25*	176	.11
EBR	1	1600	25	.02	45	.03
WBL	2	3200	57	.02*	203	.06
WBT	1	1600	149	.09	553	.35*
WBR	1	1600	215	.13	456	.29
TOTAL CAPACITY UTILIZATION				.65		.86

548 . Bristol St. at Baker St.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	72	.02	148	.05
NBT	4	6400	516	.08*	930	.15*
NBR	1	1600	221	.14	182	.11
SBL	2	3200	494	.15*	469	.15*
SBT	3	4800	611	.13	876	.18
SBR	1	1600	173	.11	594	.37
EBL	3	4800	372	.08	302	.06*
EBT	3	4800	1429	.31*	611	.14
EBR	0	0	70		76	
WBL	2	3200	120	.04*	259	.08
WBT	3	4800	296	.06	1061	.22*
WBR	1	1600	325	.20	670	.42
Right Turn Adjustment			NBR	.03*	Multi	.17*
TOTAL CAPACITY UTILIZATION				.61		.75

549 . Bristol St. at Newport Blvd. SB

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	198	.06*	621	.19*
NBT	3	4800	930	.19	1340	.28
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	910	.19*	650	.14*
SBR	d	1600	272	.17	529	.33
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.19*
TOTAL CAPACITY UTILIZATION				.25		.52

550 . Bristol St. at Newport Blvd. NB

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	665	.14	1418	.30*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	834	.17*	692	.14
SBR	0	0	0		0	
EBL	1.5		435	{.15}*	378	.12*
EBT	0	4800	0	.15	0	
EBR	1.5		286		212	{.01}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
TOTAL CAPACITY UTILIZATION				.32		.42

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\wProj\EXE-TEST 193\ICU\P30WP-C-COM02-102909

715 . Bristol St. at I-405 NB Ramps

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6400	2000	.31*	2375	.37*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	5	8000	2208	.28	2569	.33
SBR	0	0	22		65	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	2	3200	50	.02	304	.10
WBL	1.5		111		230	
WBT	1.5	4800	78	.04*	305	.11*
WBR	2	3200	570	.18	829	.26
Right Turn Adjustment			WBR	.14*	Multi	.22*

TOTAL CAPACITY UTILIZATION .49 .70

716 . Bristol St. at I-405 SB Ramps

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	178	.11*	269	.17*
NBT	4	6400	1491	.23	2577	.40
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	1390	.29*	1937	.40*
SBR	f		932		1348	
EBL	3	4800	699	.15*	637	.13*
EBT	0	0	0		0	
EBR	1	1600	610	.38	202	.13
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.15*		

TOTAL CAPACITY UTILIZATION .70 .70

717 . Bear St. at SR-73 SB Ramps

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3200	394	.25*	990	.38*
NBR	0	0	446	.28	234	
SBL	2	3200	724	.23*	1176	.37*
SBT	2	3200	616	.19	1239	.39
SBR	0	0	0		0	
EBL	1.5		166	.10*	270	{.14}*
EBT	0	3200	0		0	.14
EBR	0.5		354	.22	181	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .58 .89

718 . Bear St. at SR-73 NB Ramps

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	96	.03*	315	.10*
NBT	2	3200	416	.13	748	.23
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	1080	.25*	1334	.34*
SBR	0	0	134		305	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	170	.11*	276	.17*
WBT	0	0	0		0	
WBR	2	3200	804	.25	1282	.40
Right Turn Adjustment			WBR	.03*	WBR	.07*

TOTAL CAPACITY UTILIZATION .42 .68

721 . Flower St. at Sunflower Av.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	63	.04*	66	.04*
NBT	2	3200	240	.08	562	.18
NBR	1	1600	96	.06	92	.06
SBL	1	1600	170	.11	71	.04
SBT	2	3200	408	.17*	349	.18*
SBR	0	0	132		240	
EBL	2	3200	111	.03	241	.08*
EBT	3	4800	839	.19*	629	.15
EBR	0	0	80		110	
WBL	2	3200	104	.03*	111	.03
WBT	3	4800	375	.09	1188	.27*
WBR	0	0	80		100	

TOTAL CAPACITY UTILIZATION .43 .57

722 . Anton Blvd. at Sunflower Av.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	25	.02*	23	.01*
NBT	0	0	0		0	
NBR	2	3200	361	.11	658	.21
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	1179	.26*	692	.15
EBR	0	0	59		48	
WBL	2	3200	351	.11*	492	.15
WBT	3	4800	545	.11	1507	.31*
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.01*	NBR	.08*

TOTAL CAPACITY UTILIZATION .40 .40

726 . Main St. at Sunflower Av.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	542	.17*	1363	.43*
NBT	3	4800	396	.08	1186	.25
NBR	0	0	3		1	
SBL	1	1600	9	.01	1	.00
SBT	2	3200	871	.27*	489	.15*
SBR	1	1600	260	.16	531	.33
EBL	1.5		446	{.14}*	487	{.15}*
EBT	0.5	3200	0	.14	0	.15
EBR	2	3200	1124	.35	734	.23
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.08*	SBR	.07*

TOTAL CAPACITY UTILIZATION .66 .80

735 . Newport Blvd. NB at Del Mar Av./University Dr.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	134		175	
NBT	3	4800	1141	.27*	657	.17*
NBR	1	1600	215	.13	188	.12
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	775	.24*	448	.14*
EBT	2	3200	735	.23	682	.21
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1.5	4800	346	.16*	615	.19*
WBR	1.5		444		305	.19

TOTAL CAPACITY UTILIZATION .67 .50

736 . Newport Blvd. SB at Del Mar Av./University

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	158	.10	307	.19
SBT	3	4800	474	.10*	1421	.30*
SBR	f		500		1202	
EBL	0	0	0		0	
EBT	4	6400	1282	.21*	793	.13*
EBR	0	0	46		57	
WBL	1	1600	170	.11*	162	.10*
WBT	2	3200	330	.10	628	.20
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .42 .53

737 . Newport Blvd. NB at Mesa Dr.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	18	.01	22	.01
NBT	2	3200	489	.19*	372	.14*
NBR	0	0	133		74	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	90	.03	82	.03*
EBT	1	1600	147	.09*	276	.17
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1600	62	.06	225	.16*
WBR	0	0	41		30	

TOTAL CAPACITY UTILIZATION .28 .33

738 . Newport Blvd. SB at Mesa Dr.

P2030 Constraint With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	231	.14	376	.24
SBT	4	6400	1119	.17*	2784	.44*
SBR	1	1600	0	.00	0	.00
EBL	0	0	0		0	
EBT	1	1600	0	.00*	0	.00*
EBR	1	1600	0	.00	0	.00
WBL	1	1600	80	.05*	269	.17*
WBT	1	1600	0	.00	0	.00
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .22 .61

42 . Red Hill Av. at Barranca Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	327	.10*	869	.26
NBT	4	6800	600	.09	1965	.29*
NBR	d	1700	84	.05	177	.10
SBL	2	3400	366	.11	333	.10*
SBT	4	6800	1172	.17*	682	.10
SBR	d	1700	211	.12	214	.13
EBL	2	3400	362	.11	315	.09*
EBT	4	6800	1336	.26*	902	.17
EBR	0	0	470	.28	251	
WBL	2	3400	407	.12*	148	.04
WBT	4	6800	855	.13	949	.14*
WBR	1	1700	270	.16	513	.30
Right Turn Adjustment					WBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.70		.75

43 . Red Hill Av. at Deere Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	139	.08*	40	.02
NBT	3	5100	947	.19	2734	.54*
NBR	d	1700	102	.06	34	.02
SBL	1	1700	74	.04	28	.02*
SBT	3	5100	1782	.35*	1116	.22
SBR	d	1700	116	.07	16	.01
EBL	1	1700	9	.01	90	.05
EBT	1	1700	34	.04*	77	.11*
EBR	0	0	37		115	
WBL	1	1700	31	.02*	90	.05*
WBT	1	1700	35	.02	63	.04
WBR	1	1700	54	.03	237	.14
Right Turn Adjustment					WBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.54		.78

44 . Red Hill Av. at Alton Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	161	.09*	52	.03
NBT	3	5100	1044	.27	2336	.53*
NBR	0	0	358		381	
SBL	1	1700	199	.12	182	.11*
SBT	3	5100	1594	.31*	1143	.22
SBR	d	1700	104	.06	23	.01
EBL	1	1700	11	.01	44	.03
EBT	2	3400	53	.02*	237	.07*
EBR	1	1700	57	.03	150	.09
WBL	2	3400	439	.13*	537	.16*
WBT	1	1700	205	.12	144	.08
WBR	1	1700	95	.06	470	.28
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.60		.92

45 . Red Hill Av. at McGaw Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	594	.17*	174	.05
NBT	3	5100	1411	.28	2240	.44*
NBR	1	1700	308	.18	238	.14
SBL	2	3400	332	.10	121	.04*
SBT	3	5100	1596	.31*	1728	.34
SBR	d	1700	88	.05	99	.06
EBL	1	1700	28	.02	118	.07
EBT	2	3400	49	.03*	201	.12*
EBR	0	0	123	.07	410	.24
WBL	2	3400	321	.09*	351	.10*
WBT	2	3400	179	.09	87	.05
WBR	0	0	131		312	.18
Right Turn Adjustment					EBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.65		.76

47 . Red Hill Av. at MacArthur Blvd.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	112	.07	439	.26*
NBT	3	5100	1053	.22*	1225	.26
NBR	0	0	55		98	
SBL	2	3400	386	.11*	639	.19
SBT	3	5100	1164	.23	969	.19*
SBR	f		510		1295	
EBL	2	3400	1160	.34*	812	.24*
EBT	3	5100	721	.14	363	.07
EBR	d	1700	189	.11	177	.10
WBL	1	1700	88	.05	104	.06
WBT	3	5100	550	.11*	865	.17*
WBR	f		712		823	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .83 .91

48 . Red Hill Av. at Sky Park N

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	39	.02	33	.02
NBT	3	5100	1091	.21*	1403	.28*
NBR	d	1700	76	.04	37	.02
SBL	1	1700	165	.10*	92	.05*
SBT	3	5100	1060	.21	1104	.22
SBR	d	1700	159	.09	60	.04
EBL	1	1700	28	.02*	94	.06*
EBT	1	1700	30	.02	33	.02
EBR	1	1700	23	.01	53	.03
WBL	1	1700	18	.01	101	.06
WBT	1	1700	22	.07*	76	.19*
WBR	0	0	101		254	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .63

49 . Red Hill Av. at Main St.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	269	.08	439	.13
NBT	2	3400	896	.26*	1032	.30*
NBR	1	1700	365	.21	269	.16
SBL	2	3400	170	.05*	230	.07*
SBT	2	3400	631	.19	730	.21
SBR	f		249		540	
EBL	2	3400	343	.10	341	.10*
EBT	3	5100	1574	.38*	1281	.33
EBR	0	0	342		408	
WBL	2	3400	168	.05*	352	.10
WBT	3	5100	632	.15	1601	.34*
WBR	0	0	131		157	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .79 .86

70 . Gillette Av. at Main St.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	59	.02*	263	.08
NBT	1	1700	5	.00	40	.02*
NBR	1	1700	36	.02	489	.29
SBL	2	3400	54	.02	301	.09*
SBT	1	1700	29	.02*	17	.01
SBR	d	1700	57	.03	294	.17
EBL	2	3400	385	.11*	163	.05*
EBT	4	6800	1250	.18	1471	.22
EBR	f		307		72	
WBL	2	3400	264	.08	71	.02
WBT	3	5100	1074	.27*	1213	.25*
WBR	0	0	310		57	
Right Turn Adjustment					Multi	.31*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .47 .77

71 . Armstrong St. at Barranca Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04*	210	.12
NBT	1	1700	58	.03	245	.14*
NBR	1	1700	82	.05	295	.17
SBL	1	1700	109	.06	139	.08*
SBT	1	1700	122	.07*	131	.08
SBR	1	1700	79	.05	99	.06
EBL	1	1700	90	.05	100	.06
EBT	4	6800	1122	.17*	1076	.16*
EBR	d	1700	135	.08	118	.07
WBL	1	1700	294	.17*	171	.10*
WBT	4	6800	1665	.27	1150	.19
WBR	0	0	171		145	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .50 .53

77 . MacArthur Bl. at Sky Park E.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	118	.07*	86	.05
NBT	3	5100	1218	.24	1708	.33*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6800	1172	.19*	1020	.16
SBR	0	0	142		64	
EBL	2	3400	32	.01*	157	.05*
EBT	0	0	0		0	
EBR	1	1700	68	.04	264	.16
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .32 .43

78 . MacArthur Bl. at Main St.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	905	.27*	837	.25*
NBT	4	6800	949	.14	1266	.19
NBR	f		1416		577	
SBL	2	3400	409	.12	253	.07
SBT	4	6800	797	.12*	1178	.17*
SBR	1	1700	104	.06	100	.06
EBL	1	1700	107	.06	87	.05
EBT	3	5100	745	.15*	710	.14*
EBR	1	1700	548	.32	793	.47
WBL	2	3400	345	.10*	739	.22*
WBT	3	5100	521	.10	733	.14
WBR	f		194		567	
Right Turn Adjustment					EBR	.08*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .69 .91

79 . MacArthur Bl. at I-405 NB Ramps

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	2513	.37*	2301	.34*
NBR	2	3400	257	.08	974	.29
SBL	2	3400	233	.07*	616	.18*
SBT	4	6800	1604	.24	2068	.30
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	1046	.31*	622	.18*
WBT	0	0	0		0	
WBR	2	3400	727	.21	299	.09
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .80 .75

80 . MacArthur Bl. at I-405 SB Ramps

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1601	.24*	2649	.39*
NBR	1	1700	374	.22	733	.43
SBL	2	3400	221	.07*	617	.18*
SBT	4	6800	1786	.26	1688	.25
SBR	1	1700	618	.36	459	.27
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	1024	.30*	712	.21*
WBT	1	1700	248	.15	291	.17
WBR	f		1128		611	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .83

82 . MacArthur Bl. at Michelson Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	263	.15*	181	.11
NBT	4	6800	1357	.20	1795	.26*
NBR	1	1700	317	.19	125	.07
SBL	2	3400	538	.16	868	.26*
SBT	4	6800	2208	.32*	2008	.30
SBR	0	0	0		0	
EBL	2	3400	293	.09*	484	.14
EBT	2	3400	204	.07	219	.10*
EBR	0	0	45		117	
WBL	2	3400	137	.04	562	.17*
WBT	1	1700	157	.09*	119	.07
WBR	1	1700	340	.20	849	.50
Right Turn Adjustment					WBR	.11*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION .70 .95

83 . MacArthur Bl. at Douglas Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1649	.25*	1587	.24
NBR	0	0	68		66	
SBL	2	3400	472	.14*	304	.09
SBT	4	6800	1753	.26	2327	.34*
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	47	.03*	63	.04*
WBT	0	0	0		0	
WBR	1	1700	241	.14	403	.24
Right Turn Adjustment					WBR	.12*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .47 .55

87 . Dupont Dr. at Michelson Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	133	.08*	295	.17*
NBT	2	3400	73	.04	108	.06
NBR	0	0	55		118	.07
SBL	1	1700	45	.03	130	.08
SBT	2	3400	26	.02*	83	.05*
SBR	0	0	39	.02	119	.07
EBL	1	1700	82	.05	101	.06*
EBT	2	3400	810	.33*	582	.20
EBR	0	0	317		103	
WBL	1	1700	37	.02*	54	.03
WBT	3	5100	468	.12	1036	.23*
WBR	0	0	146		131	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .50 .56

97 . Von Karman Av. at Barranca Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	271	.08*	441	.13*
NBT	2	3400	315	.09	385	.11
NBR	d	1700	256	.15	696	.41
SBL	2	3400	115	.03	272	.08
SBT	2	3400	446	.13*	497	.15*
SBR	2	3400	120	.04	173	.05
EBL	2	3400	92	.03	74	.02
EBT	3	5100	659	.13*	1162	.23*
EBR	1	1700	292	.17	237	.14
WBL	2	3400	612	.18*	266	.08*
WBT	4	6800	1459	.21	845	.12
WBR	1	1700	193	.11	81	.05
Right Turn Adjustment					NBR	.15*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .79

98 . Von Karman Av. at Alton Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	89	.05*	174	.10
NBT	2	3400	613	.18	1233	.36*
NBR	d	1700	93	.05	408	.24
SBL	1	1700	65	.04	295	.17*
SBT	2	3400	1160	.34*	557	.16
SBR	d	1700	49	.03	119	.07
EBL	1	1700	54	.03*	73	.04
EBT	2	3400	352	.10	997	.29*
EBR	d	1700	66	.04	121	.07
WBL	1	1700	344	.20	132	.08*
WBT	2	3400	1012	.30*	626	.18
WBR	d	1700	223	.13	134	.08
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .77 .95

99 . Von Karman Av. at McGaw Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	87	.05*	50	.03
NBT	2	3400	580	.17	2027	.60*
NBR	d	1700	51	.03	126	.07
SBL	1	1700	68	.04	56	.03*
SBT	2	3400	1440	.42*	653	.19
SBR	d	1700	72	.04	49	.03
EBL	1	1700	25	.01*	117	.07
EBT	2	3400	232	.09	608	.21*
EBR	0	0	64		94	
WBL	1	1700	176	.10	33	.02*
WBT	2	3400	570	.19*	280	.12
WBR	0	0	65		116	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .91

100 . Von Karman Av. at Main St.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	170	.05*	381	.11
NBT	2	3400	508	.15	1202	.35*
NBR	1	1700	111	.07	328	.19
SBL	1	1700	95	.06	180	.11*
SBT	2	3400	1286	.38*	723	.21
SBR	1	1700	309	.18	216	.13
EBL	2	3400	377	.11*	538	.16
EBT	3	5100	645	.13	1706	.33*
EBR	f		378		187	
WBL	2	3400	370	.11	141	.04*
WBT	3	5100	1153	.25*	774	.17
WBR	0	0	127		104	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .84 .88

101 . Von Karman Av. at Morse Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	279	.08*	92	.03
NBT	2	3400	761	.26	1579	.47*
NBR	0	0	110		16	
SBL	1	1700	142	.08	41	.02*
SBT	2	3400	1348	.40*	964	.28
SBR	f		159		37	
EBL	1	1700	16	.01*	61	.04*
EBT	1	1700	8	.00	2	.00
EBR	f		57		277	
WBL	1	1700	15	.01	93	.05
WBT	1	1700	2	.04*	12	.10*
WBR	0	0	63		165	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .68

102 . Von Karman Av. at Michelson Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	69	.04	75	.04*
NBT	2	3400	1036	.30*	1073	.32
NBR	1	1700	114	.07	113	.07
SBL	1	1700	214	.13*	280	.16
SBT	2	3400	809	.28	1512	.51*
SBR	0	0	148		209	
EBL	2	3400	191	.06	237	.07
EBT	2	3400	281	.10*	588	.21*
EBR	0	0	58		115	
WBL	1	1700	243	.14*	213	.13*
WBT	2	3400	553	.16	776	.23
WBR	f		424		400	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .94

103 . Von Karman Av. at Dupont Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	116	.07	74	.04*
NBT	2	3400	1235	.38*	1123	.37
NBR	0	0	57		124	
SBL	1	1700	102	.06*	102	.06
SBT	2	3400	865	.25	1529	.45*
SBR	1	1700	44	.03	38	.02
EBL	1	1700	5	.00	21	.01
EBT	2	3400	111	.05*	214	.12*
EBR	0	0	74		186	
WBL	1	1700	122	.07*	95	.06*
WBT	2	3400	190	.09	277	.13
WBR	0	0	110		166	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .72

104 . Von Karman Av. at Martin

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	39	.02	34	.02*
NBT	2	3400	1154	.34*	1093	.32
NBR	1	1700	17	.01	33	.02
SBL	1	1700	29	.02*	33	.02
SBT	2	3400	760	.30	1523	.52*
SBR	0	0	259		232	
EBL	2	3400	190	.06*	205	.06*
EBT	1	1700	4	.03	3	.03
EBR	0	0	48		53	
WBL	1	1700	2	.00	24	.01
WBT	1	1700	2	.00*	14	.04*
WBR	0	0	6		52	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .47 .69

112 . Myford Rd. at Michelle Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	56	.03*	36	.02
NBT	2	3400	67	.04	360	.17*
NBR	0	0	68	.04	234	
SBL	1	1700	121	.07	110	.06*
SBT	2	3400	280	.11*	83	.03
SBR	0	0	100		18	
EBL	1	1700	6	.00	64	.04
EBT	2	3400	52	.02	374	.11*
EBR	d	1700	13	.01	32	.02
WBL	1	1700	88	.05	52	.03*
WBT	2	3400	285	.10*	102	.06
WBR	0	0	38		106	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .29 .42

113 . Myford Rd. at Walnut Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	9	.01*	113	.07
NBT	1	1700	5	.00	120	.07*
NBR	f .		67		292	
SBL	2	3400	104	.03	149	.04*
SBT	1	1700	31	.02*	12	.01
SBR	1	1700	232	.14	142	.08
EBL	1	1700	71	.04	78	.05*
EBT	2	3400	869	.26*	839	.25
EBR	d	1700	50	.03	11	.01
WBL	2	3400	329	.10*	37	.01
WBT	2	3400	879	.26	1084	.32*
WBR	1	1700	153	.09	122	.07
Right Turn Adjustment			SBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .48 .53

114 . Millikan Av. at Barranca Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	204	.12*	53	.03
NBT	2	3400	76	.02	30	.01*
NBR	d	1700	130	.08	455	.27
SBL	2	3400	57	.02	259	.08*
SBT	0.5	3400	38	.02*	80	.05
SBR	1.5		46	{.02}	35	
EBL	2	3400	48	.01*	42	.01
EBT	3	5100	643	.13	1739	.34*
EBR	d	1700	212	.12	123	.07
WBL	1	1700	170	.10	119	.07*
WBT	4	6800	1756	.26*	900	.13
WBR	1	1700	180	.11	594	.35
Right Turn Adjustment					NBR	.21*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .46 .76

115 . Millikan Av. at Alton Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	12	.01	33	.02
NBT	1	1700	10	.01*	42	.02*
NBR	1	1700	28	.02	75	.04
SBL	1	1700	89	.05*	117	.07*
SBT	1	1700	29	.02	16	.01
SBR	1	1700	172	.10	177	.10
EBL	1	1700	121	.07*	239	.14
EBT	2	3400	422	.12	1078	.32*
EBR	d	1700	29	.02	25	.01
WBL	1	1700	112	.07	40	.02*
WBT	2	3400	956	.28*	630	.19
WBR	d	1700	169	.10	119	.07
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .46 .48

116 . Cartwright Rd. at Main St.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	46	.03*	99	.06*
NBT	1	1700	2	.00	2	.00
NBR	1	1700	52	.03	289	.17
SBL	2	3400	8	.00	96	.03
SBT	1	1700	4	.01*	6	.04*
SBR	0	0	18		58	
EBL	1	1700	49	.03*	19	.01
EBT	3	5100	624	.14	2115	.43*
EBR	0	0	94		56	
WBL	2	3400	245	.07	88	.03*
WBT	3	5100	1637	.34*	1163	.23
WBR	0	0	80		8	
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .46 .69

119 . Teller Av. at Michelson Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	82	.02	173	.05
NBT	1	1700	15	.03*	0	.27*
NBR	0	0	33		457	
SBL	1	1700	310	.18*	200	.12*
SBT	1	1700	152	.09	62	.04
SBR	1	1700	317	.19	148	.09
EBL	1	1700	33	.02	187	.11*
EBT	3	5100	377	.07*	1048	.21
EBR	1	1700	189	.11	200	.12
WBL	1	1700	489	.29*	39	.02
WBT	3	5100	1511	.30	822	.16*
WBR	1	1700	82	.05	84	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .71

126 . Jamboree Rd. at Bryan Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	117	.03*	266	.08
NBT	4	6800	681	.10	2005	.29*
NBR	1	1700	174	.10	432	.25
SBL	2	3400	348	.10	85	.03*
SBT	4	6800	2367	.35*	950	.14
SBR	d	1700	133	.08	202	.12
EBL	2	3400	66	.02	233	.07
EBT	2	3400	438	.13*	553	.16*
EBR	d	1700	206	.12	115	.07
WBL	2	3400	538	.16*	345	.10*
WBT	2	3400	560	.16	602	.18
WBR	1	1700	273	.16	242	.14
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .63

127 . Jamboree Rd. at El Camino Real

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	272	.08*	464	.14
NBT	4	6800	804	.12	1716	.25*
NBR	1	1700	585	.34	305	.18
SBL	1	1700	214	.13	124	.07*
SBT	4	6800	2548	.37*	966	.14
SBR	1	1700	158	.09	202	.12
EBL	1	1700	82	.05	221	.13
EBT	1	1700	155	.09*	201	.12*
EBR	2	3400	194	.06	330	.10
WBL	2	3400	359	.11*	724	.21*
WBT	2	3400	82	.04	264	.14
WBR	0	0	67		204	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .70 .70

128 . Jamboree Rd. at I-5 NB Ramps

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1317	.19	2595	.38*
NBR	f		680		710	
SBL	0	0	0		0	
SBT	4	6800	1868	.27*	1718	.25
SBR	f		470		480	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		1112	.33*	382	.22*
WBT	0	5100	0		0	
WBR	1.5		503	.30	995	.29
Right Turn Adjustment					WBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.65		.72

129 . Jamboree Rd. at I-5 SB Ramps

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1527	.22	2524	.37*
NBR	f		390		1070	
SBL	0	0	0		0	
SBT	4	6800	2197	.32*	1594	.23
SBR	f		626		510	
EBL	2	3400	465	.14*	696	.20*
EBT	0	0	0		0	
EBR	2	3400	965	.28	816	.24
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.14*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.65		.62

130 . Jamboree Rd. at Michelle Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	383	.23*	273	.16*
NBT	4	6800	1469	.22	3018	.44
NBR	d	1700	0	.00	0	.00
SBL	1	1700	0	.00	0	.00
SBT	4	6800	3265	.48*	2171	.32*
SBR	d	1700	552	.32	307	.18
EBL	2	3400	139	.04*	550	.16*
EBT	0.5	3400	20	{.01}	40	{.06}
EBR	1.5		212		361	
WBL	1	1700	3	.00	8	.00
WBT	1	1700	5	.00*	10	.01*
WBR	0	0	2		12	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.80		.70

131 . Jamboree Rd. SB at Walnut Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	430	.13	363	.11
SBT	2	3400	713	.21*	716	.21*
SBR	1	1700	327	.19	172	.10
EBL	0	0	0		0	
EBT	3	5100	470	.09*	617	.12*
EBR	1	1700	219	.13	374	.22
WBL	2	3400	299	.09*	310	.09*
WBT	3	5100	493	.10	838	.16
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.04*	EBR	.10*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.48		.57

132 . Jamboree Rd. NB at Walnut Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	289	.09	602	.18
NBT	2	3400	462	.14*	672	.20*
NBR	d	1700	368	.22	540	.32
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3400	37	.01	213	.06*
EBT	3	5100	862	.17*	830	.16
EBR	0	0	0		0	
WBL	0	0	4		0	
WBT	3	5100	831	.16	918	.18*
WBR	1	1700	511	.30	605	.36
Right Turn Adjustment			Multi	.22*	Multi	.24*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.58		.73

133 . Jamboree Rd. at Edinger Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	90	.03	200	.06
NBT	0	0	0		0	
NBR	1	1700	129	.08	390	.23
SBL	2	3400	462	.14*	553	.16*
SBT	0	0	0		0	
SBR	f		998		397	
EBL	2	3400	300	.09*	704	.21*
EBT	3	5100	882	.18	941	.20
EBR	0	0	11		85	
WBL	2	3400	199	.06	185	.05
WBT	3	5100	1227	.24*	1046	.21*
WBR	1	1700	582	.34	418	.25
Right Turn Adjustment					NBR	.06*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.52		.69

134 . Loop Rd. at Warner Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	29	.02	76	.04
NBT	2	3400	9	.00*	201	.06*
NBR	1	1700	110	.06	425	.25
SBL	1	1700	161	.09*	196	.12*
SBT	2	3400	128	.04	263	.08
SBR	f		1042		302	
EBL	2	3400	49	.01	46	.01
EBT	2	3400	919	.27*	2132	.63*
EBR	1	1700	82	.05	29	.02
WBL	2	3400	140	.04*	346	.10*
WBT	2	3400	919	.27	797	.23
WBR	1	1700	12	.01	36	.02
Right Turn Adjustment			NBR	.03*	NBR	.11*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.48		1.07

136 . Jamboree Rd. at Barranca Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	236	.07*	270	.08
NBT	4	6800	1372	.20	3147	.46*
NBR	f		175		263	
SBL	2	3400	429	.13	406	.12*
SBT	4	6800	3148	.46*	1823	.27
SBR	f		1119		388	
EBL	2.5		202	.06	1138	
EBT	2.5	8500	657	.13*	831	.23*
EBR	1	1700	101	.06	142	.08
WBL	2	3400	244	.07	305	.09
WBT	3	5100	797	.16*	942	.18*
WBR	f		208		525	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing

TOTAL CAPACITY UTILIZATION .87 1.04

137 . Jamboree Rd. at Beckman Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	45	.03*	17	.01
NBT	4	6800	1615	.26	3499	.52*
NBR	0	0	124		42	
SBL	1	1700	51	.03	49	.03*
SBT	4	6800	3435	.53*	2171	.33
SBR	0	0	169		71	
EBL	1	1700	108	.06*	246	.14*
EBT	1	1700	15	.01	29	.02
EBR	d	1700	8	.00	14	.01
WBL	1	1700	107	.06	58	.03
WBT	1	1700	37	.06*	22	.04*
WBR	0	0	58		50	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .73 .78

138 . Jamboree Rd. at Alton Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	308	.09*	235	.07
NBT	5	8500	1356	.16	3030	.36*
NBR	1	1700	226	.13	212	.12
SBL	2	3400	275	.08	229	.07*
SBT	4	6800	2947	.48*	1946	.32
SBR	0	0	304		197	
EBL	2	3400	97	.03*	231	.07
EBT	3	5100	369	.09	1209	.27*
EBR	0	0	84		180	
WBL	2	3400	169	.05	283	.08*
WBT	3	5100	867	.17*	578	.11
WBR	d	1700	196	.12	219	.13
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .82 .83

139 . Jamboree Rd. at McGaw Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	242	.07*	115	.03
NBT	4	6800	1681	.25	3245	.49*
NBR	0	0	35		111	
SBL	2	3400	23	.01	35	.01*
SBT	4	6800	2841	.46*	2147	.33
SBR	0	0	316		65	
EBL	1	1700	63	.04*	264	.16*
EBT	2	3400	52	.03	293	.15
EBR	0	0	47		224	
WBL	1	1700	72	.04	59	.03
WBT	2	3400	222	.08*	70	.03*
WBR	0	0	46		41	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .70 .74

140 . Jamboree Rd. at Kelvin Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	195	.11*	159	.09
NBT	4	6800	1783	.28	3454	.57*
NBR	0	0	121		421	
SBL	1	1700	8	.00	22	.01*
SBT	4	6800	3286	.48*	2627	.39
SBR	d	1700	26	.02	37	.02
EBL	1	1700	44	.03	35	.02
EBT	1	1700	11	.01*	28	.02*
EBR	d	1700	136	.08	167	.10
WBL	1	1700	318	.19*	155	.09*
WBT	1	1700	38	.04	23	.02
WBR	0	0	34		11	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .84 .74

141 . Jamboree Rd. at Main St.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	705	.21*	593	.17*
NBT	4	6800	1825	.27	2938	.43
NBR	f		216		465	
SBL	2	3400	487	.14	345	.10
SBT	4	6800	2718	.40*	2495	.37*
SBR	1	1700	667	.39	235	.14
EBL	2	3400	162	.05	570	.17
EBT	3	5100	327	.06*	1250	.25*
EBR	f		302		799	
WBL	2	3400	691	.20*	596	.18*
WBT	3	5100	718	.14	412	.08
WBR	f		103		352	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .92 1.02

143 . Jamboree Rd. at I-405 NB Ramps

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1987	.39*	3759	.74*
NBR	f		620		1110	
SBL	0	0	0		0	
SBT	4	6800	2023	.30	2748	.40
SBR	f		1800		1170	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	3	5100	1397	.27*	792	.16*
WBT	0	0	0		0	
WBR	f		1003		251	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .71 .95

144 . Jamboree Rd. at I-405 SB Ramps

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1857	.27	3337	.49*
NBR	f		650		1120	
SBL	0	0	0		0	
SBT	4	6800	3108	.46*	3082	.45
SBR	f		290		680	
EBL	1.5		743	{.40}*	1463	.43*
EBT	0	6800	0	.40	0	
EBR	2.5		1992		1228	.36
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .91 .97

145 . Jamboree Rd. at Michelson Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	156	.09*	75	.04
NBT	4	6800	1516	.22	2574	.38*
NBR	f		267		601	
SBL	2	3400	923	.27	1285	.38*
SBT	4	6800	2796	.41*	2193	.32
SBR	f		541		512	
EBL	2	3400	327	.10*	1106	.33*
EBT	2	3400	360	.11	397	.12
EBR	1	1700	94	.06	167	.10
WBL	2	3400	440	.13	422	.12
WBT	2	3400	543	.16*	393	.12*
WBR	f		697		1014	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .81 1.26

146 . Jamboree Rd. at Dupont Rd.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	252	.15*	136	.08*
NBT	4	6800	1640	.24	2531	.37
NBR	1	1700	19	.01	39	.02
SBL	1	1700	74	.04	222	.13
SBT	3	5100	2378	.47*	2281	.45*
SBR	d	1700	478	.28	280	.16
EBL	2	3400	91	.03	376	.11
EBT	1	1700	27	.05*	79	.24*
EBR	0	0	63		327	
WBL	1	1700	40	.02*	53	.03*
WBT	2	3400	60	.04	44	.03
WBR	0	0	139	.08	84	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .85

164 . Construction S. at Barranca Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	27	.02*	321	.19
NBT	1	1700	27	.03	25	.19*
NBR	0	0	17		304	
SBL	1	1700	56	.03	71	.04*
SBT	1	1700	63	.04*	43	.03
SBR	1	1700	129	.08	185	.11
EBL	1	1700	279	.16*	167	.10*
EBT	3	5100	978	.19	1335	.26
EBR	1	1700	80	.05	20	.01
WBL	1	1700	258	.15	88	.05
WBT	3	5100	904	.18*	1513	.30*
WBR	d	1700	84	.05	58	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .68

168 . Murphy Av. at Alton Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	35	.02	79	.05
NBT	1	1700	26	.09*	166	.32*
NBR	0	0	120		376	
SBL	1	1700	44	.03*	110	.06*
SBT	1	1700	47	.05	60	.11
SBR	0	0	38		130	
EBL	1	1700	130	.08*	65	.04
EBT	3	5100	728	.14	1474	.29*
EBR	d	1700	65	.04	44	.03
WBL	1	1700	159	.09	126	.07*
WBT	3	5100	1170	.23*	881	.17
WBR	d	1700	114	.07	29	.02
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .48 .79

170 . Union at Main St.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	155	.05*	659	.19*
NBT	1	1700	4	.01	8	.05
NBR	0	0	12		70	
SBL	1	1700	12	.01	41	.02
SBT	1	1700	2	.00*	2	.00*
SBR	1	1700	35	.02	48	.03
EBL	2	3400	110	.03*	117	.03
EBT	3	5100	537	.11	1869	.37*
EBR	f		361		120	
WBL	2	3400	68	.02	38	.01*
WBT	3	5100	1396	.28*	643	.13
WBR	0	0	7		26	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .41 .62

171 . Veneto at Main St.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	236	.07*	163	.05
NBT	1	1700	6	.02	24	.12*
NBR	0	0	27		182	
SBL	1	1700	47	.03	30	.02*
SBT	1	1700	12	.05*	7	.02
SBR	0	0	71		24	
EBL	1	1700	25	.01*	105	.06
EBT	3	5100	348	.08	1708	.35*
EBR	0	0	58		88	
WBL	2	3400	80	.02	45	.01*
WBT	3	5100	1048	.21*	433	.09
WBR	0	0	19		41	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .39 .55

174 . Carlson Av. at Michelson Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	449	.13*	121	.04*
NBT	2	3400	200	.06	107	.03
NBR	1	1700	250	.15	422	.25
SBL	2	3400	60	.02	195	.06
SBT	1	1700	40	.02*	201	.12*
SBR	f		289		686	
EBL	2	3400	672	.20*	626	.18
EBT	2	3400	832	.24	1233	.36*
EBR	1	1700	79	.05	434	.26
WBL	1	1700	271	.16	375	.22*
WBT	2	3400	996	.29*	1013	.30
WBR	f		160		217	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .79

175 . Carlson Av. at Campus Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	258	.15*	338	.20*
SBT	0	0	2		0	
SBR	1	1700	372	.22	262	.15
EBL	1	1700	209	.12*	393	.23*
EBT	2	3400	1076	.32	1557	.46
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	1413	.42*	1272	.37*
WBR	d	1700	203	.12	249	.15
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .85

180 . Harvard Av. at Walnut Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	315	.09*	374	.11*
NBT	1	1700	69	.04	70	.04
NBR	d	1700	155	.09	219	.13
SBL	1	1700	190	.11	120	.07
SBT	1	1700	121	.07*	53	.03*
SBR	1	1700	149	.09	67	.04
EBL	1	1700	40	.02*	126	.07
EBT	2	3400	545	.16	832	.24*
EBR	1	1700	325	.19	345	.20
WBL	1	1700	134	.08	192	.11*
WBT	2	3400	1046	.31*	809	.24
WBR	d	1700	110	.06	44	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .54

181 . Harvard Av. at Edinger Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	271	.08	305	.09
NBT	2	3400	225	.07*	508	.15*
NBR	1	1700	153	.09	298	.18
SBL	1	1700	270	.16*	127	.07*
SBT	2	3400	381	.11	258	.08
SBR	d	1700	140	.08	95	.06
EBL	2	3400	93	.03*	177	.05*
EBT	3	5100	1181	.23	1266	.25
EBR	1	1700	222	.13	136	.08
WBL	2	3400	299	.09	116	.03
WBT	3	5100	1492	.31*	1460	.31*
WBR	0	0	112		146	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .63

182 . Harvard Av. at Paseo Westpark

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	128	.08*	0	.00
NBT	2	3400	309	.09	977	.29*
NBR	d	1700	42	.02	121	.07
SBL	1	1700	42	.02	33	.02*
SBT	2	3400	767	.23*	462	.14
SBR	1	1700	154	.09	108	.06
EBL	1	1700	72	.04	97	.06
EBT	1	1700	107	.06*	177	.10*
EBR	d	1700	0	.00	0	.00
WBL	1	1700	208	.12*	78	.05*
WBT	1	1700	0	.00	102	.06
WBR	d	1700	281	.17	117	.07
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .51

183 . Harvard Av. at Warner Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	136	.08*	269	.16
NBT	2	3400	262	.08	1028	.30*
NBR	d	1700	82	.05	133	.08
SBL	1	1700	147	.09	79	.05*
SBT	2	3400	888	.26*	446	.13
SBR	d	1700	184	.11	95	.06
EBL	1	1700	173	.10*	272	.16*
EBT	2	3400	432	.13	659	.19
EBR	d	1700	154	.09	129	.08
WBL	1	1700	110	.06	75	.04
WBT	2	3400	663	.20*	586	.17*
WBR	d	1700	87	.05	110	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .73

184 . Harvard Av. at Barranca Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	166	.10*	333	.20
NBT	2	3400	387	.11	1112	.33*
NBR	1	1700	78	.05	127	.07
SBL	1	1700	174	.10	107	.06*
SBT	2	3400	791	.23*	455	.13
SBR	1	1700	215	.13	77	.05
EBL	2	3400	65	.02*	174	.05
EBT	3	5100	540	.11	1116	.22*
EBR	1	1700	184	.11	256	.15
WBL	2	3400	197	.06	129	.04*
WBT	3	5100	1074	.23*	939	.21
WBR	0	0	89		144	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .63 .70

185 . Harvard Av. at Alton Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	331	.10*	200	.06
NBT	2	3400	418	.12	1288	.38*
NBR	d	1700	100	.06	179	.11
SBL	1	1700	36	.02	86	.05*
SBT	2	3400	934	.27*	569	.17
SBR	1	1700	261	.15	136	.08
EBL	2	3400	144	.04*	343	.10
EBT	3	5100	454	.09	1125	.22*
EBR	1	1700	242	.14	320	.19
WBL	2	3400	215	.06	180	.05*
WBT	3	5100	938	.19*	603	.13
WBR	0	0	38		59	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .75

186 . Harvard Av. at Main St.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	107	.03*	136	.04
NBT	2	3400	415	.12	1207	.36*
NBR	1	1700	82	.05	327	.19
SBL	2	3400	70	.02	38	.01*
SBT	2	3400	1102	.32*	790	.23
SBR	1	1700	509	.30	173	.10
EBL	2	3400	164	.05*	738	.22
EBT	3	5100	217	.06	1375	.33*
EBR	0	0	91		287	
WBL	2	3400	407	.12	144	.04*
WBT	3	5100	734	.15*	221	.05
WBR	0	0	41		26	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .79

187 . Harvard Av. at Coronado

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	182	.05*	217	.06
NBT	2	3400	498	.15	1472	.44*
NBR	0	0	9		39	
SBL	1	1700	30	.02	71	.04*
SBT	2	3400	1398	.41*	1016	.30
SBR	d	1700	170	.10	75	.04
EBL	2	3400	45	.01*	100	.03
EBT	1	1700	1	.00	62	.04*
EBR	d	1700	156	.09	269	.16
WBL	1	1700	35	.02	17	.01*
WBT	1	1700	9	.01*	11	.01
WBR	1	1700	87	.05	52	.03
Right Turn Adjustment			EBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .58

188 . Harvard Av. at Michelson Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	131	.08*	121	.07
NBT	2	3400	311	.10	1031	.34*
NBR	0	0	29		110	
SBL	1	1700	152	.09	314	.18*
SBT	2	3400	874	.26*	641	.19
SBR	1	1700	528	.31	359	.21
EBL	2	3400	174	.05*	469	.14*
EBT	2	3400	348	.10	976	.29
EBR	f		90		157	
WBL	1	1700	137	.08	92	.05
WBT	2	3400	741	.26*	501	.20*
WBR	0	0	145		169	
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.71		.91

189 . Harvard Av. at University Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	108	.06*	110	.06
NBT	2	3400	293	.09	698	.21*
NBR	d	1700	80	.05	292	.17
SBL	1	1700	20	.01	76	.04*
SBT	2	3400	618	.18*	573	.17
SBR	d	1700	423	.25	290	.17
EBL	1	1700	133	.08*	555	.33*
EBT	3	5100	780	.17	2032	.42
EBR	0	0	74		101	
WBL	1	1700	209	.12	176	.10
WBT	3	5100	2359	.48*	1090	.22*
WBR	0	0	83		38	
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.86		.85

190 . University Dr. at Campus Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	224	.07*	345	.10
NBT	3	5100	669	.13	1662	.33*
NBR	1	1700	493	.29	431	.25
SBL	2	3400	133	.04	108	.03*
SBT	3	5100	2041	.40*	1136	.22
SBR	1	1700	415	.24	167	.10
EBL	2	3400	354	.10*	570	.17*
EBT	2	3400	886	.26	973	.29
EBR	d	1700	34	.02	165	.10
WBL	2	3400	38	.01	270	.08
WBT	2	3400	753	.22*	1060	.31*
WBR	d	1700	209	.12	132	.08
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.84		.89

191 . Mesa Rd. at University Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	54	.03*	343	.20*
NBT	0	0	0		0	
NBR	1	1700	95	.06	272	.16
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1325	.26*	2308	.45*
EBR	1	1700	258	.15	127	.07
WBL	1	1700	252	.15*	193	.11*
WBT	3	5100	2026	.40	1347	.26
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.49		.81

192 . California Av. at University Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	225	.07*	747	.22*
NBT	0	0	0		0	
NBR	1	1700	235	.14	913	.54
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1445	.28*	1487	.29*
EBR	1	1700	869	.51	414	.24
WBL	2	3400	841	.25*	236	.07*
WBT	3	5100	1285	.25	1493	.29
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.18*	NBR	.27*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.83		.90

193 . MacArthur Blvd. NB at University Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	33	.02*	13	.01*
NBT	0	0	0		0	
NBR	1	1700	323	.19	324	.19
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1997	.39*	1546	.30*
EBR	d	1700	151	.09	114	.07
WBL	2	3400	599	.18*	1256	.37*
WBT	3	5100	897	.18	957	.19
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.03*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.67		.73

196 . Hearthstone Bl. at ICD

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	27	.02*	33	.02*
NBT	2	3400	42	.01	54	.02
NBR	d	1700	411	.24	318	.19
SBL	1	1700	42	.02	28	.02
SBT	1	1700	43	.03*	37	.02*
SBR	d	1700	24	.01	26	.02
EBL	1	1700	33	.02	79	.05
EBT	3	5100	1526	.32*	1644	.34*
EBR	0	0	106		81	
WBL	1	1700	260	.15*	401	.24*
WBT	3	5100	1739	.34	1861	.37
WBR	0	0	15		37	
Right Turn Adjustment			NBR	.10*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.67		.67

198 . Paseo Westpark at Warner Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	108	.06*	134	.08
NBT	1	1700	90	.05	269	.16*
NBR	d	1700	42	.02	48	.03
SBL	1	1700	69	.04	58	.03*
SBT	1	1700	330	.19*	115	.07
SBR	d	1700	72	.04	57	.03
EBL	1	1700	154	.09*	117	.07*
EBT	2	3400	494	.15	564	.17
EBR	d	1700	92	.05	156	.09
WBL	1	1700	93	.05	69	.04
WBT	2	3400	637	.19*	579	.17*
WBR	d	1700	149	.09	94	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .48

199 . Paseo Westpark at Barranca Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	83	.02*	178	.05
NBT	1	1700	119	.07	339	.20*
NBR	1	1700	179	.11	223	.13
SBL	2	3400	123	.04	88	.03*
SBT	1	1700	254	.15*	160	.09
SBR	d	1700	74	.04	71	.04
EBL	1	1700	34	.02*	107	.06
EBT	3	5100	708	.14	1203	.24*
EBR	1	1700	94	.06	169	.10
WBL	1	1700	232	.14	152	.09*
WBT	3	5100	1383	.28*	1044	.24
WBR	0	0	67		155	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .61

200 . Paseo Westpark at Alton Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	83	.05	105	.06
NBT	1	1700	146	.16*	331	.27*
NBR	0	0	119		124	
SBL	1	1700	205	.12*	95	.06*
SBT	1	1700	161	.09	124	.07
SBR	1	1700	215	.13	141	.08
EBL	1	1700	31	.02	77	.05
EBT	3	5100	639	.15*	811	.17*
EBR	0	0	141		53	
WBL	1	1700	149	.09*	133	.08*
WBT	3	5100	1116	.22	734	.14
WBR	d	1700	142	.08	162	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .63

201 . Paseo Westpark at Main St.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	190	.11	46	.03
NBT	1	1700	193	.18*	356	.23*
NBR	0	0	117		40	
SBL	1	1700	172	.10*	41	.02*
SBT	1	1700	249	.15	121	.07
SBR	1	1700	189	.11	95	.06
EBL	1	1700	19	.01*	102	.06
EBT	2	3400	350	.10	739	.22*
EBR	d	1700	140	.08	127	.07
WBL	1	1700	72	.04	22	.01*
WBT	2	3400	961	.28*	289	.09
WBR	d	1700	129	.08	81	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .53

221 . Culver Dr. at Bryan Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	386	.11*	683	.20*
NBT	3	5100	667	.13	1584	.31
NBR	1	1700	238	.14	525	.31
SBL	2	3400	142	.04	159	.05
SBT	3	5100	2186	.43*	903	.18*
SBR	d	1700	352	.21	156	.09
EBL	2	3400	141	.04*	262	.08*
EBT	1.5	5100	270	{.13}	478	{.14}
EBR	1.5		518		450	{.11}
WBL	2	3400	556	.16	268	.08
WBT	2	3400	692	.26*	664	.25*
WBR	0	0	182		177	
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .89 .76

222 . Culver Dr. at Trabuco Rd.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	565	.11*	1849	.36*
NBR	f		1072		1483	
SBL	1	1700	711	.42*	347	.20*
SBT	3	5100	2430	.48	1262	.25
SBR	f		717		180	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	670	.20*	538	.16*
WBT	0	0	0		0	
WBR	2	3400	822	.24	891	.26
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .78 .77

223 . Culver Dr. at I-5 SB Ramps

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1247	.24	2022	.40*
NBR	f		241		300	
SBL	0	0	0		0	
SBT	3	5100	2196	.43*	1499	.29
SBR	f		322		250	
EBL	3	5100	514	.10*	1018	.20*
EBT	0	0	0		0	
EBR	2	3400	409	.12	941	.28
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment		EBR		.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .65

224 . Culver Dr. at Walnut Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	169	.05*	363	.11
NBT	3	5100	788	.15	1641	.32*
NBR	1	1700	295	.17	365	.21
SBL	2	3400	274	.08	396	.12*
SBT	3	5100	1940	.38*	1479	.29
SBR	1	1700	469	.28	295	.17
EBL	2	3400	389	.11*	591	.17*
EBT	2	3400	661	.19	539	.16
EBR	1	1700	253	.15	140	.08
WBL	2	3400	447	.13	401	.12
WBT	2	3400	742	.22*	732	.22*
WBR	1	1700	293	.17	257	.15
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .81 .88

225 . Culver Dr. at Deerfield Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	45	.01*	115	.03
NBT	3	5100	992	.19	1832	.36*
NBR	1	1700	106	.06	133	.08
SBL	2	3400	153	.05	150	.04*
SBT	3	5100	2181	.43*	1569	.31
SBR	1	1700	254	.15	321	.19
EBL	1	1700	191	.11*	454	.27*
EBT	1	1700	181	.11	167	.10
EBR	d	1700	127	.07	169	.10
WBL	1	1700	182	.11	82	.05
WBT	1	1700	181	.21*	93	.13*
WBR	0	0	178		124	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .81 .85

226 . Culver Dr. at ICD

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	349	.10*	375	.11*
NBT	4	6800	720	.11	1502	.22
NBR	f		221		392	
SBL	2	3400	216	.06	276	.08
SBT	4	6800	1868	.27*	1375	.20*
SBR	1	1700	335	.20	210	.12
EBL	2	3400	253	.07	320	.09*
EBT	3	5100	1205	.24*	1202	.24
EBR	f		292		217	
WBL	2	3400	404	.12*	279	.08
WBT	3	5100	1318	.26	1315	.26*
WBR	f		109		198	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .78 .71

227 . Culver Dr. at Warner Av.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	156	.09*	292	.17*
NBT	3	5100	1101	.22	1941	.38
NBR	1	1700	73	.04	202	.12
SBL	1	1700	80	.05	98	.06
SBT	3	5100	2333	.46*	1474	.29*
SBR	d	1700	198	.12	283	.17
EBL	2	3400	276	.08	231	.07
EBT	2	3400	257	.08*	250	.07*
EBR	d	1700	276	.16	219	.13
WBL	1	1700	226	.13*	137	.08*
WBT	2	3400	387	.11	226	.07
WBR	d	1700	146	.09	148	.09
Right Turn Adjustment		EBR	.01*			
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .82 .66

228 . Culver Dr. at Barranca Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	149	.04*	294	.09
NBT	3	5100	772	.15	1781	.35*
NBR	1	1700	378	.22	388	.23
SBL	2	3400	352	.10	291	.09*
SBT	3	5100	2165	.42*	1282	.25
SBR	f		304		230	
EBL	2	3400	474	.14	345	.10*
EBT	2	3400	922	.27*	711	.21
EBR	1	1700	223	.13	496	.29
WBL	2	3400	396	.12*	282	.08
WBT	3	5100	828	.19	756	.21*
WBR	0	0	147		334	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .90 .80

229 . Culver Dr. at Alton Pkwy.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	116	.03*	278	.08
NBT	3	5100	1018	.20	2149	.42*
NBR	1	1700	283	.17	374	.22
SBL	2	3400	174	.05	224	.07*
SBT	3	5100	2191	.43*	1276	.25
SBR	f		283		240	
EBL	2	3400	146	.04	287	.08
EBT	2	3400	623	.18*	832	.24*
EBR	1	1700	185	.11	280	.16
WBL	2	3400	444	.13*	354	.10*
WBT	2	3400	901	.26	723	.21
WBR	1	1700	217	.13	253	.15
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .82 .88

230 . Culver Dr. at Main St.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	135	.04*	131	.04
NBT	3	5100	1132	.22	2211	.43*
NBR	1	1700	145	.09	484	.28
SBL	2	3400	64	.02	204	.06*
SBT	3	5100	2247	.44*	1651	.32
SBR	f		522		168	
EBL	2	3400	187	.06	584	.17*
EBT	2	3400	121	.04*	417	.12
EBR	f		106		161	
WBL	2	3400	526	.15*	159	.05
WBT	2	3400	323	.10	83	.02*
WBR	1	1700	121	.07	77	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .73

231 . Culver Dr. at Paseo Westpark

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	193	.11*	246	.14
NBT	3	5100	1316	.26	2692	.53*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2773	.54*	1908	.37
SBR	d	1700	147	.09	74	.04
EBL	1	1700	77	.05*	58	.03*
EBT	0	0	0		0	
EBR	1	1700	324	.19	72	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.06*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .81 .61

232 . Culver Dr. at I-405 NB Ramps

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	849	.17	2175	.43*
NBR	f		560		400	
SBL	0	0	0		0	
SBT	3	5100	1340	.26*	1291	.25
SBR	f		930		690	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	850	.25*	469	.14*
WBT	0	0	0		0	
WBR	1	1700	521	.31	805	.47
Right Turn Adjustment					WBR	.33*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .56 .95

233 . Culver Dr. at I-405 SB Ramps

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1073	.21	1643	.32*
NBR	f		270		730	
SBL	0	0	0		0	
SBT	3	5100	1887	.37*	1313	.26
SBR	f		250		340	
EBL	1.5		307	{.16}*	967	.28*
EBT	0	5100	0	.16	0	
EBR	1.5		523		497	{.25}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .65

234 . Culver Dr. at Michelson Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	122	.04*	391	.12
NBT	3	5100	950	.19	1883	.38*
NBR	0	0	9		78	
SBL	2	3400	183	.05	563	.17*
SBT	3	5100	1865	.37*	889	.17
SBR	1	1700	349	.21	361	.21
EBL	2	3400	348	.10	337	.10
EBT	1	1700	153	.09*	178	.10*
EBR	1	1700	269	.16	218	.13
WBL	1	1700	82	.05*	173	.10*
WBT	2	3400	102	.03	168	.05
WBR	1	1700	207	.12	300	.18
Right Turn Adjustment			EBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .64 .80

235 . Culver Dr. at University Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	71	.04
NBT	4	6800	1457	.21*	1727	.25*
NBR	2	3400	385	.11	939	.28
SBL	2	3400	30	.01*	30	.01*
SBT	4	6800	1380	.20	1164	.17
SBR	d	1700	395	.23	339	.20
EBL	2	3400	55	.02	421	.12
EBT	3	5100	655	.13*	1121	.22*
EBR	d	1700	19	.01	26	.02
WBL	2	3400	682	.20*	811	.24*
WBT	3	5100	1445	.29	770	.16
WBR	0	0	29		62	
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for NBR						

TOTAL CAPACITY UTILIZATION .60 .77

337 . Von Karman Ave. at Quartz

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	413	.24*	200	.12*
NBT	2	3400	1174	.35	1396	.41
NBR	1	1700	191	.11	57	.03
SBL	1	1700	183	.11	78	.05
SBT	2	3400	1034	.30*	1369	.40*
SBR	d	1700	251	.15	101	.06
EBL	2	3400	54	.02*	199	.06*
EBT	1	1700	6	.00	5	.00
EBR	1	1700	72	.04	435	.26
WBL	1	1700	34	.02	56	.03
WBT	1	1700	16	.01*	9	.01*
WBR	f		62		165	
Right Turn Adjustment					EBR	.13*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .77

439 . Bixby at Michleson Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	15	.01*	30	.02*
NBT	1	1700	2	.00	4	.02
NBR	0	0	3		26	
SBL	2	3400	9	.00	132	.04
SBT	1	1700	3	.03*	4	.14*
SBR	0	0	48		227	
EBL	1	1700	282	.17*	142	.08*
EBT	2	3400	498	.16	722	.22
EBR	0	0	50		29	
WBL	1	1700	27	.02	68	.04
WBT	2	3400	567	.17*	922	.27*
WBR	1	1700	76	.04	53	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .43 .56

440 . Siglo at Main St.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	145	.04*	302	.09*
SBT	0	0	0		0	
SBR	1	1700	153	.09	88	.05
EBL	2	3400	56	.02*	188	.06
EBT	3	5100	605	.12	2325	.46*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5100	1827	.36*	1115	.22
WBR	1	1700	234	.14	102	.06
Right Turn Adjustment			SBR	.03*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .50 .60

441 . Loop Rd. at Jamboree Rd. SB Ramps

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	20	.01	120	.04*
NBR	1	1700	20	.01	80	.05
SBL	1	1700	20	.01	30	.02*
SBT	2	3400	210	.06*	140	.04
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		560	.16*	280	.08*
WBT	0	5100	0		0	
WBR	1.5		50		90	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .27 .19

472 . Obsidian at Michleson Dr.

P2030 Constraint With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	8		24	
NBT	1	1700	0	.02*	0	.04*
NBR	0	0	33		46	
SBL	0	0	11	{.01}*	145	{.09}*
SBT	1	1700	0	.01	0	.09
SBR	f		19		85	
EBL	1	1700	107	.06*	42	.02*
EBT	2	3400	476	.15	799	.24
EBR	0	0	33		14	
WBL	1	1700	37	.02	26	.02
WBT	2	3400	1373	.40*	871	.26*
WBR	f		143		68	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .46

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\wProj\EXE-TEST 193\ICU\P30WP-C-NPB01-102909

61 . Airport Wy. at Campus Dr.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	2	3200	420	.13	609	.19
EBL	1	1600	192	.12	232	.15*
EBT	3	4800	1620	.34*	1140	.24
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	610	.17	1491	.37*
WBR	0	0	228		308	
Right Turn Adjustment			SBR	.13*	SBR	.19*

TOTAL CAPACITY UTILIZATION .47 .71

62 . Campus Dr. at Bristol St. NB

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	618	.19	765	.24*
NBT	3	4800	2259	.47*	776	.16
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6400	293	.05	1044	.16*
SBR	2	3200	457	.14	1196	.37
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	207	.13	346	.22
WBT	5	8000	1555	.24*	2550	.34*
WBR	0	0	461	.29	154	
Right Turn Adjustment			WBR	.05*	SBR	.21*

TOTAL CAPACITY UTILIZATION .76 .95

63 . Campus Dr. at Bristol St. SB

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	5	8000	1432	.21*	849	.13*
NBR	0	0	234		213	.13
SBL	1	1600	203	.13*	319	.20*
SBT	3	4800	308	.06	1099	.23
SBR	0	0	0		0	
EBL	1.5		1448	{.53}*	598	{.26}*
EBT	2.5	6400	1964	.53	1065	.26
EBR	2	3200	442	.14	448	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .87 .59

64 . Birch St. at Bristol St. NB

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	246	.08	308	.10*
NBT	2	3200	1252	.39*	712	.22
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	1.5	6400	352	.11	829	.32*
SBR	2.5		270	.08	1211	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		650		781	
WBT	3.5	8000	1760	.35*	1681	.33*
WBR	0		382		208	

TOTAL CAPACITY UTILIZATION .74 .75

65 . Birch St. at Bristol St. SB

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2.5	6400	530	.15*	664	.17
NBR	1.5		410		395	
SBL	2	3200	288	.09*	361	.11
SBT	2	3200	643	.20	1261	.39*
SBR	0	0	0		0	
EBL	1.5		753	{.27}*	316	{.20}*
EBT	3	8000	1047	.27	1114	.20
EBR	0.5		350		189	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .51 .59

84 . MacArthur Bl. at Campus Dr.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	63	.02	112	.04
NBT	4	6400	1053	.16*	1085	.17*
NBR	1	1600	119	.07	94	.06
SBL	1	1600	354	.22*	264	.17*
SBT	3.5	8000	1103	.17	1303	.26
SBR	1.5		288		752	
EBL	2	3200	494	.15*	382	.12*
EBT	3	4800	1058	.22	772	.16
EBR	d	1600	114	.07	117	.07
WBL	2	3200	122	.04	160	.05
WBT	3	4800	608	.13*	1286	.27*
WBR	f		233		203	

TOTAL CAPACITY UTILIZATION .66 .73

85 . MacArthur Bl. at Birch St.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	55	.03	132	.08*
NBT	3	4800	1750	.36*	1230	.26
NBR	f		108		53	
SBL	1	1600	163	.10*	180	.11
SBT	4	6400	848	.17	2260	.39*
SBR	0	0	223		213	
EBL	1.5		176	.11*	302	{.17}*
EBT	1.5	4800	549	.20	497	.17
EBR	0		86		24	
WBL	1	1600	56	.04	136	.09
WBT	2	3200	502	.16*	1046	.33*
WBR	f		124		188	

TOTAL CAPACITY UTILIZATION .73 .97

105 . Von Karman Av. at Campus Dr.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	17	.01	87	.05*
NBT	2	3200	768	.24*	647	.20
NBR	f		91		169	
SBL	1	1600	121	.08*	240	.15
SBT	2	3200	586	.23	1028	.42*
SBR	0	0	157		324	
EBL	2	3200	302	.09*	288	.09*
EBT	2	3200	688	.23	681	.23
EBR	0	0	36		65	
WBL	1	1600	99	.06	127	.08
WBT	2	3200	516	.21*	979	.34*
WBR	0	0	141		105	

TOTAL CAPACITY UTILIZATION .62 .90

106 . Von Karman Av. at Birch St.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	40	.03	95	.06*
NBT	2	3200	603	.21*	561	.22
NBR	0	0	73		155	
SBL	1	1600	70	.04*	61	.04
SBT	2	3200	375	.19	673	.28*
SBR	0	0	238		235	
EBL	1	1600	114	.07*	195	.12*
EBT	2	3200	307	.12	514	.18
EBR	0	0	67		52	
WBL	1	1600	128	.08	46	.03
WBT	2	3200	492	.16*	610	.22*
WBR	0	0	33		93	

TOTAL CAPACITY UTILIZATION .48 .68

107 . Von Karman Av. at MacArthur Bl.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	38	.02*	139	.09
NBT	2	3200	130	.04	272	.09*
NBR	f		41		180	
SBL	2	3200	181	.06	749	.23*
SBT	1	1600	198	.12*	124	.08
SBR	f		32		66	
EBL	1	1600	65	.04*	72	.05
EBT	3	4800	472	.10	1001	.21*
EBR	f		154		66	
WBL	1	1600	82	.05	50	.03*
WBT	3	4800	896	.19*	665	.14
WBR	f		720		196	

TOTAL CAPACITY UTILIZATION .37 .56

121 . Teller Av. at Campus Dr.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	6	.00	39	.02*
NBT	1	1600	50	.03	102	.06
NBR	1	1600	34	.02	59	.04
SBL	1	1600	50	.03	152	.10
SBT	1	1600	125	.14*	135	.20*
SBR	0	0	93		184	
EBL	1	1600	126	.08*	76	.05
EBT	2	3200	760	.24	969	.30*
EBR	f		41		28	
WBL	1	1600	54	.03	67	.04*
WBT	2	3200	593	.25*	677	.25
WBR	0	0	216		112	

TOTAL CAPACITY UTILIZATION .47 .56

147 . Jamboree Rd. at Campus Dr.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	191	.06	127	.04
NBT	4	6400	1512	.24*	2009	.31*
NBR	1	1600	158	.10	589	.37
SBL	2	3200	508	.16*	402	.13*
SBT	4	6400	1835	.30	2044	.35
SBR	0	0	110		170	
EBL	2	3200	166	.05	359	.11*
EBT	2	3200	693	.22*	639	.20
EBR	f		62		321	
WBL	2	3200	813	.25*	355	.11
WBT	2	3200	489	.15	683	.21*
WBR	1	1600	222	.14	432	.27

Note: Assumes Right-Turn Overlap for WBR NBR

TOTAL CAPACITY UTILIZATION .87 .76

148 . Jamboree Rd. at Birch St.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	160	.10*	199	.12*
NBT	3	4800	1740	.36	2025	.42
NBR	0	0	1		1	
SBL	1	1600	5	.00	1	.00
SBT	4	6400	2240	.35*	2344	.37*
SBR	f		481		311	
EBL	1.5		154	{.05}*	545	{.17}*
EBT	0.5	3200	2	.05	0	.17
EBR	f		35		196	
WBL	0	0	0		0	
WBT	1	1600	0	.00*	0	.00*
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .50 .66

149 . Jamboree Rd. at Fairchild Rd.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	10	.01	30	.02
NBT	3	4800	2036	.44*	1955	.42*
NBR	0	0	55		42	
SBL	2	3200	326	.10*	342	.11*
SBT	4	6400	1953	.31	2240	.35
SBR	d	1600	8	.01	3	.00
EBL	1	1600	50	.03	142	.09
EBT	1	1600	0	.04*	85	.27*
EBR	0	0	71		340	
WBL	1	1600	11	.01*	30	.02*
WBT	1	1600	2	.00	17	.01
WBR	1	1600	380	.24	293	.18
Right Turn Adjustment			WBR	.22*		

TOTAL CAPACITY UTILIZATION .81 .82

150 . Jamboree Rd. at MacArthur Bl.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	447	.14*	232	.07*
NBT	4	6400	1213	.19	1174	.18
NBR	1	1600	244	.15	41	.03
SBL	3	4800	590	.12	683	.14
SBT	3	4800	1048	.22*	1616	.34*
SBR	1	1600	272	.17	170	.11
EBL	2	3200	182	.06*	280	.09
EBT	3	4800	576	.12	1267	.26*
EBR	f		152		332	
WBL	2	3200	151	.05	312	.10*
WBT	3	4800	1591	.33*	748	.16
WBR	1	1600	734	.46	526	.33
Right Turn Adjustment			WBR	.13*	WBR	.06*

TOTAL CAPACITY UTILIZATION .88 .83

151 . Jamboree Rd. at Bristol St. NB-SR73 NB Ramps

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	717	.22*	565	.18*
NBT	3	4800	1740	.36	2251	.47
NBR	f		0		0	
SBL	0	0	0		0	
SBT	2.5	6400	560	.17*	1257	.36*
SBR	1.5		513		1068	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .39 .54

153 . Jamboree Rd. at Bristol St. SB

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	6	9600	1505	.16*	1625	.18
NBR	0	0	36		74	
SBL	0	0	0		0	
SBT	4	6400	618	.10	1173	.18*
SBR	0	0	0		0	
EBL	2.5		1546	.32*	1285	{.35}*
EBT	1.5	6400	483	.30	986	.35
EBR	2	3200	762	.24	887	.28
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .48 .53

154 . Jamboree Rd. at Eastbluff Dr.-University Dr.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	38	.02	28	.02*
NBT	3	4800	1304	.27*	1363	.28
NBR	1	1600	216	.14	249	.16
SBL	2	3200	152	.05*	244	.08
SBT	3	4800	1131	.24	1707	.36*
SBR	1	1600	364	.23	506	.32
EBL	1.5		452	{.20}*	278	{.13}*
EBT	0.5	3200	158	.20	127	.13
EBR	0		17		18	
WBL	1.5		292		275	
WBT	1.5	4800	208	.10*	216	.10*
WBR	f		368		207	

TOTAL CAPACITY UTILIZATION .62 .61

155 . Jamboree Rd. at Bison Av.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	1193	.25*	1537	.32
NBR	d	1600	278	.17	152	.10
SBL	2	3200	202	.06*	168	.05
SBT	3	4800	1339	.28	1768	.37*
SBR	1	1600	210	.13	120	.08
EBL	1	1600	108	.07*	64	.04
EBT	0	0	0		0	
EBR	1	1600	84	.05	38	.02
WBL	2	3200	166	.05	424	.13*
WBT	0	0	0		0	
WBR	2	3200	159	.05	259	.08
Right Turn Adjustment			Multi	.08*	EBR	.02*

TOTAL CAPACITY UTILIZATION .46 .52

156 . Jamboree Rd. at Ford Rd.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	323	.10*	322	.10*
NBT	3	4800	1249	.28	1741	.39
NBR	0	0	77		154	
SBL	1	1600	77	.05	57	.04
SBT	3	4800	1444	.30*	2103	.44*
SBR	1	1600	239	.15	77	.05
EBL	1.5		299	{.11}*	102	.06
EBT	1.5	4800	251	.11	249	.08*
EBR	1	1600	211	.13	228	.14
WBL	1.5		93	.06	139	{.07}*
WBT	1.5	4800	388	.12*	191	.07
WBR	1	1600	38	.02	47	.03
Right Turn Adjustment					EBR	.06*

TOTAL CAPACITY UTILIZATION .63 .75

176 . Fairchild Av. at MacArthur Bl.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	50	.03*	575	.36*
SBT	0	0	0		0	
SBR	1	1600	21	.01	197	.12
EBL	1	1600	304	.19*	39	.02
EBT	3	4800	1180	.25	2055	.43*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	2499	.66*	1473	.34
WBR	0	0	656		141	

TOTAL CAPACITY UTILIZATION .88 .79

178 . MacArthur Bl. at Bison Av.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	254	.08	248	.08*
NBT	4	6400	2460	.38*	2476	.39
NBR	1	1600	183	.11	185	.12
SBL	2	3200	88	.03*	228	.07
SBT	4	6400	2044	.32	2767	.43*
SBR	1	1600	331	.21	416	.26
EBL	2	3200	257	.08	218	.07
EBT	2	3200	299	.09*	217	.07*
EBR	f		194		245	
WBL	2	3200	392	.12*	458	.14*
WBT	2	3200	276	.09	426	.13
WBR	1	1600	93	.06	176	.11

TOTAL CAPACITY UTILIZATION .62 .72

179 . MacArthur Bl. at Ford Rd.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	102	.03	57	.02
NBT	4	6400	1926	.30*	2393	.37*
NBR	f		82		444	
SBL	3	4800	560	.12*	815	.17*
SBT	4	6400	1955	.31	2369	.37
SBR	f		13		51	
EBL	2	3200	40	.01	29	.01
EBT	2	3200	271	.08*	301	.09*
EBR	1	1600	119	.07	59	.04
WBL	2	3200	558	.17*	230	.07*
WBT	2	3200	326	.10	284	.09
WBR	f		956		527	

TOTAL CAPACITY UTILIZATION .67 .70

194 . MacArthur Blvd. SB at University Dr.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	68	.04*	130	.08*
NBT	0	0	0		0	
NBR	1	1600	612	.38	543	.34
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	1548	.34*	1257	.27*
EBR	0	0	68		22	
WBL	2	3200	102	.03*	338	.11*
WBT	3	4800	1012	.21	890	.19
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.34*	NBR	.26*

TOTAL CAPACITY UTILIZATION .75 .72

195 . SR-73 SB Ramps at University Dr.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	1011	.63*	718	.45*
SBT	0	0	0		0	
SBR	1	1600	71	.04	225	.14
EBL	0	0	0		0	
EBT	3	4800	589	.12	642	.13
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	689	.14*	745	.16*
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .77 .61

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\wProj\EXE-TEST 193\ICU\P30WP-C-NPB02-102909

733 . Irvine Av. at Mesa Dr.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	119	.07	48	.03*
NBT	3	4800	1094	.23*	647	.13
NBR	d	1600	367	.23	320	.20
SBL	1	1600	30	.02*	29	.02
SBT	3	4800	494	.10	1518	.32*
SBR	d	1600	96	.06	222	.14
EBL	1	1600	146	.09	46	.03*
EBT	1	1600	283	.18*	223	.14
EBR	1	1600	46	.03	144	.09
WBL	2	3200	270	.08*	562	.18
WBT	1	1600	115	.07	553	.35*
WBR	1	1600	29	.02	38	.02

TOTAL CAPACITY UTILIZATION .51 .73

734 . Irvine Av. at University Dr.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	169	.11	178	.11*
NBT	3	4800	1270	.26*	648	.14
NBR	1	1600	1	.00	11	.01
SBL	1	1600	112	.07*	54	.03
SBT	3	4800	548	.11	1602	.33*
SBR	1	1600	181	.11	503	.31
EBL	1.5		379	{.14}*	297	{.11}*
EBT	0.5	3200	57	.14	65	.11
EBR	1	1600	122	.08	201	.13
WBL	1	1600	11	.01	27	.02
WBT	1	1600	30	.02*	73	.05*
WBR	d	1600	31	.02	50	.03

TOTAL CAPACITY UTILIZATION .49 .60

741 . Jamboree Av. at San Joaquin Hills Rd.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	50	.03	78	.05
NBT	3	4800	1134	.24*	1599	.33*
NBR	f		129		141	
SBL	2	3200	666	.21*	463	.14*
SBT	3	4800	1224	.26	1847	.38
SBR	f		45		135	
EBL	1.5		265	.08*	161	.05*
EBT	1.5	4800	34	.02	35	.02
EBR	f		61		56	
WBL	2	3200	125	.04	196	.06
WBT	1	1600	14	.01*	47	.03*
WBR	1	1600	41	.03	70	.04
Right Turn Adjustment			WBR	.02*	WBR	.01*

TOTAL CAPACITY UTILIZATION .56 .56

742 . MacArthur Blvd. at San Joaquin Hills Rd.

P2030 Constraint With Project (NEWPORT BEACH IS

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	137	.04*	110	.03*
NBT	4	6400	1312	.24	1878	.30
NBR	0	0	201		29	
SBL	3	4800	277	.06	539	.11
SBT	3	4800	1786	.37*	1881	.39*
SBR	f		489		234	
EBL	3	4800	449	.09*	523	.11*
EBT	3	4800	112	.03	375	.11
EBR	0	0	39		162	
WBL	1	1600	11	.01	53	.03
WBT	2	3200	378	.12*	328	.10*
WBR	f		471		568	

TOTAL CAPACITY UTILIZATION .62 .63

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\wProj\EXE-TEST 193\ICU\P30WP-C-SAN01-102909

4 . SR-55 SB Ramps at Edinger Av.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		428		336	
NBT	0.5	3400	42	.14*	41	.11*
NBR	2	3400	482	.14	193	.06
SBL	1	1700	83	.05*	149	.09*
SBT	1	1700	24	.03	80	.08
SBR	0	0	34		61	
EBL	1	1700	47	.03	59	.03
EBT	3	5100	1926	.38*	1862	.37*
EBR	f		289		331	
WBL	2	3400	448	.13*	472	.14*
WBT	3	5100	1838	.38	1607	.33
WBR	0	0	101		100	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .75 .76

5 . Hotel Terrace Dr. at Dyer Rd.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		186	{.06}*	188	{.06}*
NBT	0.5	3400	11	.06	11	.06
NBR	2	3400	363	.11	92	.03
SBL	0.5		116		108	
SBT	1.5	3400	178	.09*	500	.18*
SBR	1	1700	45	.03	162	.10
EBL	1	1700	61	.04	131	.08
EBT	3	5100	1305	.26*	1091	.21*
EBR	1	1700	346	.20	169	.10
WBL	2	3400	518	.15*	661	.19*
WBT	3	5100	1021	.20	1111	.22
WBR	1	1700	189	.11	49	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .69

6 . Grand Av. at Dyer Rd.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	689	.20*	768	.23*
SBT	0	0	0		0	
SBR	1	1700	442	.26	286	.17
EBL	2	3400	184	.05	323	.10*
EBT	3	5100	1601	.31*	1062	.21
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5100	1298	.25	1584	.31*
WBR	f		826		477	
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .69

7 . SR-55 NB Ramps at Dyer Rd.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		901	{.33}*	281	.08*
NBT	0	5100	0	.33	0	
NBR	1.5		786		111	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	2534	.50*	1339	.26
EBR	f		550		1020	
WBL	0	0	0		0	
WBT	2.5	5100	1269	.33	1879	.55*
WBR	0.5		390		1400	.82
Right Turn Adjustment					WBR	.21*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .88 .89

8 . SR-55 SB Ramps at MacArthur Blvd.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	1125	.33*	359	.11*
SBT	0	0	0		0	
SBR	2	3400	983	.29	748	.22
EBL	0	0	0		0	
EBT	2	3400	1385	.41*	1241	.37*
EBR	f		760		1060	
WBL	0	0	0		0	
WBT	3	5100	1387	.27	1792	.35
WBR	f		200		870	
Right Turn Adjustment					SBR	.09*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .79 .62

9 . SR-55 NB Ramps at MacArthur Blvd.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1075	.32*	748	.22*
NBT	0	0	0		0	
NBR	f		710		250	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	1660	.49*	882	.26
EBR	f		650		801	
WBL	0	0	0		0	
WBT	3	5100	755	.15	1856	.36*
WBR	f		300		1282	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .86 .63

28 . Pullman St. at Warner Av.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		71		172	
NBT	0.5	1700	17	.05*	10	.11*
NBR	1	1700	73	.04	108	.06
SBL	0	0	46	{.03}*	125	{.07}*
SBT	2	3400	18	.02	33	.06
SBR	0	0	16		151	.09
EBL	1	1700	86	.05	49	.03*
EBT	3	5100	1981	.42*	1561	.32
EBR	0	0	182		60	
WBL	1	1700	50	.03*	57	.03
WBT	3	5100	1343	.28	2042	.41*
WBR	0	0	67		31	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .67

29 . Pullman St. at Barranca Pkwy.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	159	.05*	714	.21*
NBT	1	1700	19	.03	13	.05
NBR	0	0	34		74	
SBL	1	1700	37	.02	26	.02
SBT	0.5	3400	16	{.01}*	7	{.07}*
SBR	1.5		107		387	
EBL	1	1700	360	.21	195	.11*
EBT	3	5100	1715	.43*	1173	.25
EBR	0	0	454		93	
WBL	1	1700	44	.03*	52	.03
WBT	3	5100	1219	.24	2082	.41*
WBR	0	0	23		24	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .85

543 . Bristol St. at Segerstrom Av.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	98	.06*	226	.13
NBT	3	5100	856	.17	1382	.27*
NBR	d	1700	238	.14	381	.22
SBL	1	1700	263	.15	185	.11*
SBT	3	5100	1292	.28*	1004	.22
SBR	0	0	120		112	
EBL	1	1700	256	.15	267	.16*
EBT	2	3400	1180	.38*	997	.38
EBR	0	0	96		306	
WBL	1	1700	213	.13*	272	.16
WBT	2	3400	812	.27	1165	.38*
WBR	0	0	99		124	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.90		.97

544 . Bristol St. at MacArthur Blvd.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	107	.03*	465	.14*
NBT	3	5100	835	.16	1640	.32
NBR	1	1700	129	.08	334	.20
SBL	2	3400	263	.08	289	.09
SBT	3	5100	1457	.31*	1204	.27*
SBR	0	0	149		187	
EBL	2	3400	222	.07	365	.11*
EBT	3	5100	1166	.23*	720	.14
EBR	1	1700	152	.09	165	.10
WBL	2	3400	171	.05*	378	.11
WBT	3	5100	961	.19	1396	.27*
WBR	1	1700	158	.09	276	.16
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.67		.84

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\wProj\EXE-TEST 193\ICU\P30WP-C-SAN02-102909

719 . Flower St. at Segerstrom Av.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	105	.06	131	.08*
NBT	2	3400	640	.22*	489	.20
NBR	0	0	115		180	
SBL	1	1700	151	.09*	179	.11
SBT	2	3400	479	.17	781	.26*
SBR	0	0	90		90	
EBL	1	1700	137	.08	130	.08*
EBT	2	3400	1294	.47*	861	.30
EBR	0	0	311		158	
WBL	1	1700	109	.06*	61	.04
WBT	2	3400	895	.29	1298	.41*
WBR	0	0	83		102	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.89		.88

720 . Flower St. at MacArthur Blvd.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	76	.04	30	.02
NBT	2	3400	476	.22*	593	.19*
NBR	0	0	279		57	
SBL	1	1700	222	.13*	103	.06*
SBT	2	3400	330	.18	333	.13
SBR	0	0	286		122	
EBL	1	1700	158	.09	225	.13*
EBT	3	5100	1306	.26*	990	.21
EBR	0	0	30		74	
WBL	1	1700	41	.02*	103	.06
WBT	3	5100	691	.15	1888	.42*
WBR	0	0	64		233	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.68		.85

723 . Main St. at Dyer Rd.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	94	.06*	222	.13
NBT	2	3400	498	.15	1224	.36*
NBR	1	1700	219	.13	412	.24
SBL	1	1700	209	.12	90	.05*
SBT	3	5100	1153	.26*	648	.16
SBR	0	0	192		183	
EBL	1	1700	245	.14	199	.12*
EBT	2	3400	1283	.38*	728	.21
EBR	1	1700	273	.16	112	.07
WBL	1	1700	184	.11*	210	.12
WBT	2	3400	934	.27	1125	.33*
WBR	1	1700	107	.06	158	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.86		.91

724 . Main St. at Alton Pkwy.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	12	.01*	28	.02
NBT	3	5100	837	.17	1824	.37*
NBR	0	0	51		76	
SBL	1	1700	89	.05	86	.05*
SBT	3	5100	1512	.30*	863	.17
SBR	0	0	7		29	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0.5		38		80	
WBT	0.5	1700	2	.02*	1	.05*
WBR	1	1700	33	.02	71	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.38		.52

725 . Main St. at MacArthur Blvd.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	50	.01	390	.11
NBT	3	5100	340	.07*	849	.17*
NBR	1	1700	221	.13	425	.25
SBL	2	3400	424	.12*	214	.06*
SBT	3	5100	800	.16	497	.10
SBR	1	1700	149	.09	294	.17
EBL	2	3400	296	.09	318	.09*
EBT	3	5100	1545	.30*	612	.12
EBR	1	1700	203	.12	65	.04
WBL	2	3400	347	.10*	259	.08
WBT	3	5100	701	.14	1266	.25*
WBR	1	1700	294	.17	443	.26
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .64 .62

727 . Halladay St. at Dyer Rd.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	55	.03
NBT	1	1700	16	.06*	107	.18*
NBR	0	0	84		206	
SBL	1	1700	254	.15*	183	.11*
SBT	1	1700	67	.12	63	.10
SBR	0	0	140		104	
EBL	1	1700	123	.07	190	.11*
EBT	3	5100	1452	.29*	1221	.24
EBR	0	0	18		11	
WBL	1	1700	175	.10*	86	.05
WBT	3	5100	899	.20	1352	.29*
WBR	0	0	131		103	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .74

728 . Halladay St. E at Alton Pkwy.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0.5		32		50	
SBT	0	1700	0	.16*	0	.10*
SBR	0.5		234		120	
EBL	1	1700	85	.05*	319	.19*
EBT	1	1700	48	.03	32	.02
EBR	0	0	0		0	
WBL	1	1700	0	.00	0	.00
WBT	1	1700	16	.01*	53	.03*
WBR	1	1700	35	.02	57	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .27 .37

729 . Halladay St. W at Alton Pkwy.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		1		19	
NBT	0.5	1700	0	.02*	0	.10*
NBR	0		29		152	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	1	1700	114	.09*	188	.11*
EBR	0	0	46		4	
WBL	0.5		163	{.10}*	26	{.02}*
WBT	0.5	1700	87	.15	141	.10
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .26 .28

730 . Grand Av. at Warner Av.

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	172	.10	262	.15
NBT	3	5100	617	.18*	640	.16*
NBR	0	0	331	.19	198	
SBL	1	1700	373	.22*	308	.18*
SBT	3	5100	539	.16	522	.15
SBR	0	0	278	.16	311	.18
EBL	2	3400	488	.14*	477	.14*
EBT	3	5100	1546	.30	1027	.20
EBR	1	1700	217	.13	178	.10
WBL	2	3400	195	.06	261	.08
WBT	2	3400	820	.24*	1470	.43*
WBR	1	1700	294	.17	497	.29
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.83		.96

731 . Grand Av. at SR-55 SB Ramps

P2030 Constraint With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	995	.29*	801	.24*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	684	.13	759	.15
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	456	.27*	321	.19*
WBT	0	0	0		0	
WBR	1	1700	345	.20	249	.15
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.61		.48

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\wProj\EXE-TEST 193\ICU\P30WP-C-TUS01-102909

3 . Newport Av. at Edinger Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	430	.13*	627	.18*
NBT	3	5100	234	.05	783	.15
NBR	d	1700	117	.07	101	.06
SBL	2	3400	192	.06	48	.01
SBT	3	5100	888	.17*	405	.08*
SBR	1	1700	741	.44	317	.19
EBL	2	3400	321	.09	743	.22*
EBT	3	5100	1451	.28*	852	.17
EBR	1	1700	730	.43	781	.46
WBL	1	1700	172	.10*	196	.12
WBT	3	5100	1289	.25	1370	.27*
WBR	f		85		186	
Right Turn Adjustment		Multi		.19*		
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .92 .80

14 . Walnut Av. at McFadden St.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	386	.11*	624	.18*
NBT	0	0	0		0	
NBR	1	1700	19	.01	99	.06
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	371	.22*	531	.31*
EBR	0	0	650	.38	507	
WBL	1	1700	80	.05*	53	.03*
WBT	2	3400	724	.21	436	.13
WBR	0	0	0		0	
Right Turn Adjustment		EBR		.08*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .51 .57

18 . Newport Av. at Bryan Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	77	.05*	134	.08
NBT	3	5100	736	.15	1594	.32*
NBR	0	0	20		35	
SBL	1	1700	73	.04	130	.08*
SBT	3	5100	2226	.45*	1311	.26
SBR	0	0	48		33	
EBL	1	1700	13	.01*	47	.03*
EBT	1	1700	23	.01	55	.03
EBR	1	1700	76	.04	180	.11
WBL	1	1700	33	.02	49	.03
WBT	1	1700	53	.03*	63	.04*
WBR	1	1700	216	.13	408	.24
Right Turn Adjustment					WBR	.14*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .66

19 . Newport Av. at Main St.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	124	.07	207	.12*
NBT	3	5100	583	.13*	1455	.31
NBR	0	0	73		122	
SBL	1	1700	184	.11*	102	.06
SBT	3	5100	543	.16	1135	.26*
SBR	0	0	273	.16	199	
EBL	1	1700	102	.06	224	.13*
EBT	2	3400	243	.07*	417	.12
EBR	1	1700	305	.18	229	.13
WBL	1	1700	322	.19*	239	.14
WBT	2	3400	313	.09	695	.20*
WBR	1	1700	15	.01	44	.03
Right Turn Adjustment		EBR		.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .76

20 . Newport Av. at El Camino Real

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	244	.14*	252	.15
NBT	3	5100	786	.18	1323	.29*
NBR	0	0	129		176	
SBL	1	1700	125	.07	192	.11*
SBT	3	5100	1904	.38*	1099	.23
SBR	0	0	31		93	
EBL	1	1700	16	.01	55	.03
EBT	1	1700	137	.08*	252	.15*
EBR	1	1700	395	.23	255	.15
WBL	1	1700	175	.10*	236	.14*
WBT	2	3400	247	.10	406	.16
WBR	0	0	90		142	
Right Turn Adjustment			EBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .79 .74

21 . Newport Av. at I-5 NB Ramps

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	201	.12*	327	.19*
NBT	3	5100	1253	.25	2090	.41
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1985	.50*	1320	.35*
SBR	0	0	551		483	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .59

22 . Newport Av. at Nisson Rd.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1100	.23	1845	.38*
NBR	0	0	87		100	
SBL	1	1700	171	.10	253	.15*
SBT	3	5100	1774	.35*	1152	.23
SBR	0	0	0		0	
EBL	1.5		277		368	
EBT	0.5	3400	62	.10*	50	.12*
EBR	f		439		583	
WBL	1	1700	77	.05*	78	.05*
WBT	0	0	0		0	
WBR	1	1700	163	.10	172	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .75

23 . Newport Av. at McFadden St.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	43	.03*	67	.04*
NBT	3	5100	935	.19	1548	.31
NBR	0	0	11		16	
SBL	1	1700	18	.01	40	.02
SBT	3	5100	1778	.52*	1120	.30*
SBR	0	0	909	.53	413	
EBL	2	3400	308	.09*	536	.16*
EBT	0	0	1		9	
EBR	1	1700	66	.04	36	.02
WBL	0	0	0		0	
WBT	1	1700	0	.00*	0	.00*
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .55

24 . Newport Av. at Walnut Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	45	.03	152	.09
NBT	3	5100	732	.16*	1131	.25*
NBR	0	0	96		157	
SBL	1	1700	738	.43*	560	.33*
SBT	3	5100	1109	.23	699	.15
SBR	0	0	46		59	
EBL	1	1700	122	.07	43	.03*
EBT	2	3400	426	.18*	424	.15
EBR	0	0	173		92	
WBL	1	1700	158	.09*	161	.09
WBT	2	3400	339	.20	490	.29*
WBR	0	0	376	.22	639	.38
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .91 .95

25 . Newport Av. at Sycamore Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	224	.13*	384	.23*
NBT	3	5100	415	.08	1073	.21
NBR	d	1700	107	.06	171	.10
SBL	1	1700	213	.13	244	.14
SBT	3	5100	1334	.26*	660	.13*
SBR	d	1700	99	.06	117	.07
EBL	1	1700	116	.07	94	.06*
EBT	2	3400	20	.01*	19	.01
EBR	0	0	63	.04	38	.02
WBL	1	1700	303	.18*	180	.11
WBT	2	3400	148	.09	345	.19*
WBR	0	0	189	.11	314	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .63 .66

27 . Del Amo Av. at Edinger Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		87	{.03}*	221	
NBT	0.5	3400	4	.03	0	.07*
NBR	1	1700	247	.15	259	.15
SBL	0	0	0		0	
SBT	1	1700	0	.00*	0	.00
SBR	0	0	0		0	
EBL	1	1700	13	.01	7	.00
EBT	3	5100	1518	.30*	911	.18
EBR	d	1700	180	.11	78	.05
WBL	2	3400	180	.05*	262	.08
WBT	3	5100	1467	.29	1569	.31*
WBR	d	1700	0	.00	0	.00
Right Turn Adjustment		NBR		.07*		
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for NBR						

TOTAL CAPACITY UTILIZATION .50 .43

35 . Red Hill Av. at Bryan Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	148	.09*	216	.13
NBT	3	5100	384	.10	793	.17*
NBR	0	0	135		67	
SBL	1	1700	110	.06	98	.06*
SBT	3	5100	843	.19*	425	.10
SBR	0	0	120		73	
EBL	1	1700	78	.05*	70	.04*
EBT	2	3400	605	.21	503	.20
EBR	0	0	115		160	
WBL	1	1700	92	.05	92	.05
WBT	2	3400	642	.22*	861	.30*
WBR	0	0	118		153	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .62

36 . Red Hill Av. at El Camino Real

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	323	.10*	439	.13
NBT	3	5100	600	.12	810	.16*
NBR	1	1700	158	.09	293	.17
SBL	1	1700	88	.05	248	.15*
SBT	3	5100	1263	.26*	589	.13
SBR	0	0	68		64	
EBL	1	1700	116	.07	34	.02
EBT	1.5	5100	298	{.09}*	969	.29*
EBR	1.5		306		161	
WBL	1.5		320	{.13}*	320	.19*
WBT	1.5	5100	265	.13	1027	.35
WBR	0		54		155	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .63 .84

37 . Red Hill Av. at Nisson Rd.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	21	.01*	15	.01
NBT	4	6800	799	.12	1468	.22*
NBR	0	0	40		51	
SBL	1	1700	120	.07	176	.10*
SBT	3	5100	1419	.28*	724	.14
SBR	d	1700	111	.07	45	.03
EBL	1	1700	194	.11*	223	.13*
EBT	1	1700	70	.06	187	.13
EBR	0	0	36		30	
WBL	1	1700	45	.03	74	.04
WBT	1	1700	88	.19*	111	.19*
WBR	0	0	237		206	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .64 .69

38 . Red Hill Av. at Walnut Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	140	.08*	338	.20
NBT	3	5100	379	.10	1647	.36*
NBR	0	0	151		195	
SBL	1	1700	97	.06	125	.07*
SBT	3	5100	1281	.28*	486	.13
SBR	0	0	132		198	
EBL	1	1700	153	.09	239	.14*
EBT	2	3400	506	.27*	436	.17
EBR	0	0	420		144	
WBL	2	3400	241	.07*	231	.07
WBT	2	3400	440	.17	640	.23*
WBR	0	0	129		130	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .75 .85

39 . Red Hill Av. at Sycamore Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	106	.06*	544	.32*
NBT	3	5100	609	.13	1831	.38
NBR	0	0	33		95	
SBL	1	1700	53	.03	111	.07
SBT	3	5100	1724	.37*	618	.17*
SBR	0	0	188		252	
EBL	1	1700	80	.05*	105	.06*
EBT	1	1700	25	.01	44	.03
EBR	1	1700	147	.09	160	.09
WBL	1	1700	79	.05	42	.02
WBT	1	1700	155	.09*	44	.03*
WBR	1	1700	62	.04	53	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .63

40 . Red Hill Av. at Edinger Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	68	.02*	215	.06
NBT	3	5100	235	.05	1607	.32*
NBR	1	1700	198	.12	479	.28
SBL	2	3400	303	.09	173	.05*
SBT	3	5100	1311	.26*	379	.07
SBR	1	1700	295	.17	199	.12
EBL	2	3400	226	.07	304	.09*
EBT	3	5100	1130	.22*	800	.16
EBR	1	1700	240	.14	106	.06
WBL	2	3400	649	.19*	235	.07
WBT	3	5100	1236	.24	1119	.22*
WBR	1	1700	150	.09	525	.31
Right Turn Adjustment					WBR	.04*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR EBR

TOTAL CAPACITY UTILIZATION .74 .77

41 . Red Hill Av. at Warner Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	548	.16*	801	.24
NBT	3	5100	605	.12	1969	.39*
NBR	1	1700	128	.08	206	.12
SBL	2	3400	112	.03	142	.04*
SBT	3	5100	1591	.31*	700	.14
SBR	1	1700	686	.40	438	.26
EBL	2	3400	309	.09*	323	.10*
EBT	3	5100	1287	.25	1466	.29
EBR	1	1700	439	.26	345	.20
WBL	2	3400	75	.02	139	.04
WBT	3	5100	1371	.27*	1450	.28*
WBR	1	1700	132	.08	180	.11
Right Turn Adjustment				SBR .02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .90 .86

55 . Browning Av. at Bryan Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	51	.03	87	.05
NBT	2	3400	337	.10*	647	.19*
NBR	d	1700	292	.17	89	.05
SBL	1	1700	111	.07*	65	.04*
SBT	2	3400	190	.06	124	.04
SBR	d	1700	49	.03	41	.02
EBL	1	1700	46	.03	24	.01
EBT	2	3400	837	.25*	1046	.31*
EBR	d	1700	77	.05	61	.04
WBL	1	1700	153	.09*	135	.08*
WBT	2	3400	179	.05	311	.09
WBR	1	1700	157	.09	149	.09
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .56 .67

56 . Browning Av. at El Camino Real

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	53	.03	124	.07
NBT	2	3400	245	.09*	419	.16*
NBR	0	0	71		108	
SBL	1	1700	122	.07*	69	.04*
SBT	2	3400	342	.10	176	.05
SBR	1	1700	96	.06	74	.04
EBL	1	1700	83	.05	88	.05*
EBT	2	3400	219	.08*	209	.08
EBR	0	0	67		62	
WBL	1	1700	83	.05*	127	.07
WBT	2	3400	203	.06	482	.14*
WBR	1	1700	104	.06	182	.11
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .34 .44

58 . Browning Av. at Walnut Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	238	.14*	124	.07*
SBT	0	0	0		0	
SBR	1	1700	164	.10	75	.04
EBL	1	1700	126	.07*	73	.04*
EBT	2	3400	892	.26	630	.19
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	586	.21*	1120	.45*
WBR	0	0	124		419	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .47 .61

92 . Tustin Ranch Rd. at Bryan Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	127	.07*	504	.30
NBT	3	5100	526	.10	2018	.40*
NBR	1	1700	70	.04	133	.08
SBL	1	1700	177	.10	111	.07*
SBT	3	5100	2149	.42*	675	.13
SBR	1	1700	171	.10	215	.13
EBL	2	3400	103	.03	139	.04*
EBT	2	3400	623	.18*	717	.21
EBR	1	1700	385	.23	175	.10
WBL	2	3400	266	.08*	179	.05
WBT	2	3400	282	.08	1061	.31*
WBR	d	1700	72	.04	202	.12
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR EBR

TOTAL CAPACITY UTILIZATION .80 .87

93 . Tustin Ranch Rd. at El Camino Real

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	123	.04*	548	.16
NBT	3	5100	429	.08	2238	.44*
NBR	d	1700	119	.07	302	.18
SBL	2	3400	106	.03	168	.05*
SBT	3	5100	2544	.50*	810	.16
SBR	d	1700	158	.09	72	.04
EBL	1	1700	167	.10	102	.06*
EBT	2	3400	196	.12*	360	.16
EBR	0	0	538	.32	199	
WBL	1	1700	262	.15*	222	.13
WBT	2	3400	211	.09	480	.24*
WBR	0	0	97		350	
Right Turn Adjustment			EBR	.17*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION 1.03 .84

94 . Tustin Ranch Rd. at I-5 NB Ramps

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	328	.10*	669	.20*
NBT	3	5100	914	.18	1580	.31
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2467	.48*	987	.19*
SBR	f		42		451	
EBL	1.5		146	.09*	310	.09*
EBT	0	5100	0		0	
EBR	1.5		423	.12	283	{.02}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .53

95 . Tustin Ranch Rd. at I-5 SB Ramps

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	165	.05*	249	.07
NBT	3	5100	942	.18	1774	.35*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2328	.46*	963	.19
SBR	d	1700	566	.33	324	.19
EBL	1.5		701	{.29}*	577	{.17}*
EBT	0	5100	0	{.29}	0	{.17}
EBR	1.5		858		503	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .85 .57

96 . Tustin Ranch Rd. at Walnut Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	68	.02*	267	.08
NBT	3	5100	484	.09	1374	.27*
NBR	d	1700	178	.10	339	.20
SBL	2	3400	837	.25	309	.09*
SBT	3	5100	1715	.34*	710	.14
SBR	d	1700	307	.18	232	.14
EBL	2	3400	270	.08	206	.06*
EBT	2	3400	914	.27*	472	.14
EBR	d	1700	216	.13	122	.07
WBL	2	3400	379	.11*	248	.07
WBT	2	3400	625	.18	722	.21*
WBR	d	1700	496	.29	430	.25
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .79 .68

109 . Myford Rd. at Bryan Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	58	.03*	161	.09
NBT	2	3400	67	.02	392	.15*
NBR	0	0	16		106	
SBL	1	1700	94	.06	42	.02*
SBT	2	3400	342	.13*	111	.06
SBR	0	0	106		87	
EBL	1	1700	77	.05*	80	.05*
EBT	2	3400	660	.19	652	.19
EBR	d	1700	107	.06	81	.05
WBL	1	1700	181	.11	88	.05
WBT	2	3400	956	.28*	1022	.30*
WBR	d	1700	37	.02	78	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .57

110 . Myford Rd. at El Camino Real

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	40	.02	111	.07
NBT	2	3400	69	.03*	216	.12*
NBR	0	0	33		203	
SBL	1	1700	204	.12*	121	.07*
SBT	2	3400	139	.08	47	.03
SBR	0	0	271	.16	132	.08
EBL	1	1700	16	.01	238	.14*
EBT	2	3400	143	.08*	516	.18
EBR	0	0	233	.14	95	
WBL	1	1700	159	.09*	108	.06
WBT	2	3400	259	.09	597	.23*
WBR	0	0	35		185	
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .38 .61

111 . Franklin Av. at Walnut Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	97	.06*	246	.14*
NBT	2	3400	8	.00	11	.01
NBR	0	0	16	.01	14	.01
SBL	1	1700	37	.02	65	.04
SBT	2	3400	9	.01*	9	.01*
SBR	0	0	166	.10	457	.27
EBL	1	1700	406	.24*	235	.14*
EBT	2	3400	1037	.31	745	.22
EBR	d	1700	332	.20	131	.08
WBL	1	1700	69	.04	13	.01
WBT	2	3400	706	.21*	1632	.48*
WBR	d	1700	146	.09	70	.04
Right Turn Adjustment					SBR	.15*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.57		.97

445 . Tustin Ranch Rd. at Warner Av. N.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2.5	6800	336	.10*	1011	{.27}*
NBR	1.5		675	.20	1049	
SBL	2	3400	629	.19*	391	.12*
SBT	3	5100	1231	.24	589	.12
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2.5		934	.18*	641	
WBT	0	6800	0		0	{.16}*
WBR	1.5		346	{.06}	569	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .60

446 . Tustin Ranch Rd. at Warner Av. S.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	320	.09*	415	.12*
NBT	3	5100	429	.08	875	.17
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	581	.11*	288	.06*
SBR	2	3400	1580	.46	945	.28
EBL	2	3400	581	.17*	1185	.35*
EBT	0	0	0		0	
EBR	1	1700	429	.25	652	.38
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			Multi	.23*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .58

447 . Armstrong Av. at Valencia Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	103	.03*	303	.09*
NBT	1	1700	52	.03	301	.18
NBR	d	1700	25	.01	167	.10
SBL	1	1700	32	.02	40	.02
SBT	1	1700	345	.28*	126	.12*
SBR	0	0	123		75	
EBL	1	1700	54	.03*	91	.05*
EBT	2	3400	223	.07	463	.14
EBR	1	1700	273	.16	165	.10
WBL	2	3400	142	.04	69	.02
WBT	2	3400	474	.15*	363	.12*
WBR	0	0	25		38	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .43

448 . Armstrong Av. at Warner Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	130	.04*	222	.07*
NBT	2	3400	33	.02	108	.05
NBR	0	0	48	.03	72	
SBL	1	1700	55	.03	38	.02
SBT	2	3400	68	.02*	57	.02*
SBR	1	1700	148	.09	116	.07
EBL	1	1700	95	.06*	212	.12*
EBT	3	5100	1186	.23	1273	.25
EBR	1	1700	168	.10	215	.13
WBL	1	1700	64	.04	69	.04
WBT	3	5100	1232	.24*	1277	.25*
WBR	1	1700	32	.02	70	.04
Right Turn Adjustment			SBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .43 .51

453 . Red Hill Ave. at Valencia Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06*	198	.06
NBT	3	5100	493	.10	2157	.42*
NBR	1	1700	115	.07	191	.11
SBL	2	3400	94	.03	115	.03*
SBT	3	5100	2005	.39*	628	.12
SBR	1	1700	232	.14	61	.04
EBL	1	1700	18	.01*	148	.09*
EBT	2	3400	447	.13	514	.15
EBR	1	1700	22	.01	76	.04
WBL	2	3400	144	.04	115	.03
WBT	2	3400	558	.16*	613	.18*
WBR	1	1700	77	.05	146	.09
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .77

454 . Tustin Ranch Rd. at Valencia Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	246	.07*	346	.10
NBT	3	5100	327	.06	1203	.24*
NBR	1	1700	7	.00	69	.04
SBL	2	3400	66	.02	172	.05*
SBT	3	5100	1767	.35*	750	.15
SBR	1	1700	566	.33	216	.13
EBL	2	3400	198	.06*	692	.20*
EBT	1	1700	7	.00	59	.03
EBR	1	1700	116	.07	173	.10
WBL	1	1700	77	.05	28	.02
WBT	2	3400	148	.04*	48	.01*
WBR	1	1700	65	.04	55	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .55

455 . North Loop Rd. at Edinger Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	126	.07*	205	.12*
NBT	1	1700	1	.00	1	.00
NBR	1	1700	26	.02	37	.02
SBL	1	1700	1	.00	1	.00
SBT	1	1700	1	.00*	1	.00*
SBR	1	1700	1	.00	1	.00
EBL	1	1700	1	.00	1	.00
EBT	3	5100	554	.11*	215	.04*
EBR	0	0	0		0	
WBL	1	1700	170	.10*	222	.13*
WBT	3	5100	274	.05	381	.07
WBR	1	1700	1	.00	1	.00
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .33 .34

456 . North Loop Rd. at Valencia Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	189	.11*	75	.04*
NBT	1	1700	89	.05	144	.08
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	1	1700	130	.08*	143	.08*
SBR	1	1700	51	.03	37	.02
EBL	1	1700	11	.01*	89	.05*
EBT	0	0	0		0	
EBR	1	1700	60	.04	182	.11
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					EBR	.03*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .25 .25

457 . North Loop Rd. at Moffett Dr.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	40	.01	63	.02*
NBR	1	1700	10	.01	98	.06
SBL	1	1700	30	.02	87	.05*
SBT	2	3400	100	.03*	73	.02
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	90	.05*	40	.02*
WBT	0	0	0		0	
WBR	1	1700	110	.06	30	.02
Right Turn Adjustment					NBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .13 .16

478 . Red Hill Ave. at I-5 NB Ramps

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	484	.28*	459	.27*
NBT	3	5100	816	.16	1041	.20
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1321	.26*	733	.14*
SBR	1	1700	580	.34	308	.18
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		513		399	
WBT	0.5	3400	3	.15*	49	.13*
WBR	1	1700	344	.20	503	.30
Right Turn Adjustment			SBR	.08*	Multi	.05*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .82 .64

479 . Red Hill Ave. at I-5 SB Ramps

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1047	.15*	1088	.16*
NBR	1	1700	605	.36	537	.32
SBL	1	1700	506	.30*	383	.23*
SBT	4	6800	1282	.19	738	.11
SBR	0	0	0		0	
EBL	0.5		245	{.14}*	412	{.24}*
EBT	0.5	1700	0	.14	0	.24
EBR	1	1700	434	.26	332	.20
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.21*	NBR	.16*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .85 .84

480 . Tustin Ranch Rd. at Edinger Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	27	.02*	129	.08*
NBT	0	0	0		0	
NBR	1	1700	4	.00	7	.00
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	611	.12*	233	.05
EBR	1	1700	209	.12	174	.10
WBL	2	3400	43	.01*	46	.01
WBT	3	5100	386	.08	561	.11*
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .20 .24

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline\wProj\EXE-TEST 193\ICU\P30WP-C-TUS02-102909

732 . Newport Av. at SR-55 NB Ramps

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	219	.06*	540	.16*
NBT	3	5100	347	.10	984	.23
NBR	0	0	209	.12	180	
SBL	1	1700	0	.00	48	.03
SBT	2	3400	1022	.30*	439	.13*
SBR	1	1700	198	.12	909	.53
EBL	2	3400	490	.14	523	.15*
EBT	1.5	3400	356	.16*	82	.05
EBR	0.5		189		77	
WBL	1	1700	68	.04*	195	.11
WBT	2	3400	85	.03	331	.12*
WBR	0	0	6		62	
Right Turn Adjustment					SBR	.29*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .90

739 . Newport Av. at Mitchell Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	19	.01*	16	.01
NBT	3	5100	1040	.25	1642	.37*
NBR	0	0	237		260	
SBL	1	1700	91	.05	183	.11*
SBT	3	5100	2271	.46*	1341	.29
SBR	0	0	73		146	
EBL	1	1700	128	.08	99	.06*
EBT	1	1700	63	.05*	48	.04
EBR	0	0	25		22	
WBL	1	1700	179	.11*	190	.11
WBT	1	1700	48	.07	67	.12*
WBR	0	0	64		143	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .71

740 . Red Hill Ave. at Mitchell Av.

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	38	.02	154	.09
NBT	3	5100	1537	.33*	1275	.29*
NBR	0	0	143		183	
SBL	1	1700	315	.19*	178	.10*
SBT	3	5100	1137	.25	765	.17
SBR	0	0	146		82	
EBL	0.5		34		135	
EBT	0.5	1700	43	.05*	189	.19*
EBR	1	1700	15	.01	64	.04
WBL	0.5		38	{.02}*	21	{.01}*
WBT	0.5	1700	36	.04	115	.08
WBR	1	1700	109	.06	110	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .64 .64

743 . Newport Avenue at Valencia

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	0	.00
NBT	1	1700	146	.09	643	.38*
NBR	d	1700	21	.01	58	.03
SBL	2	3400	893	.26	540	.16*
SBT	1	1700	825	.49*	363	.21
SBR	d	1700	0	.00	7	.00
EBL	1	1700	4	.00	5	.00
EBT	1	1700	5	.00*	4	.00*
EBR	d	1700	1	.00	8	.00
WBL	1	1700	85	.05*	58	.03*
WBT	1	1700	10	.01	3	.00
WBR	2	3400	640	.19	967	.28
Right Turn Adjustment					WBR	.13*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .75

745 . Tustin Ranch Road at Park Avenue

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	141	.04*	69	.02*
NBT	3	5100	429	.08	467	.09
NBR	1	1700	21	.01	15	.01
SBL	2	3400	69	.02	50	.01
SBT	3	5100	498	.10*	630	.12*
SBR	1	1700	432	.25	249	.15
EBL	2	3400	189	.06*	578	.17*
EBT	2	3400	90	.03	165	.05
EBR	1	1700	71	.04	217	.13
WBL	1	1700	51	.03	83	.05
WBT	1	1700	387	.23*	292	.17*
WBR	1	1700	132	.08	225	.13
Right Turn Adjustment			SBR	.10*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.58		.53

746 . Kensington Park Drive at Edinger Avenue

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	68	.02*	194	.06*
NBT	0	0	0		0	
NBR	1	1700	42	.02	167	.10
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1878	.37	2473	.48*
EBR	1	1700	233	.14	93	.05
WBL	2	3400	207	.06	67	.02*
WBT	3	5100	2662	.52*	2056	.40
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.59		.63

747 . Kensington Park Drive at Valencia Avenue

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	36	{.02}*	74	{.04}*
NBT	0	0	21		117	
NBR	0	0	43		202	
SBL	2	3400	55	.02	39	.01
SBT	0	0	207		27	
SBR	2	3400	48	.01	14	.00
EBL	2	3400	11	.00	39	.01
EBT	2	3400	194	.08	588	.19*
EBR	0	0	76		49	
WBL	0	0	261		83	{.05}*
WBT	2	3400	560	.24*	383	.14
WBR	1	1700	38	.02	65	.04
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.32		.33

748 . Armstrong Avenue at A Street

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	129	.08*	110	.06
NBT	2	3400	94	.03	229	.07*
NBR	d	1700	97	.06	120	.07
SBL	1	1700	99	.06	78	.05*
SBT	2	3400	160	.05*	139	.04
SBR	d	1700	131	.08	73	.04
EBL	2	3400	49	.01*	131	.04
EBT	1	1700	494	.29	615	.36*
EBR	d	1700	86	.05	125	.07
WBL	1	1700	74	.04	118	.07*
WBT	1	1700	539	.32*	560	.33
WBR	d	1700	47	.03	132	.08
Right Turn Adjustment			SBR	.02*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.53		.60

749 . Park Avenue at A Street

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	219	.06*	472	.14*
NBT	1	1700	35	.02	50	.03
NBR	d	1700	130	.08	518	.30
SBL	1	1700	2	.00	7	.00
SBT	1	1700	44	.03*	47	.03*
SBR	d	1700	4	.00	6	.00
EBL	1	1700	6	.00	6	.00
EBT	2	3400	228	.07*	449	.13*
EBR	d	1700	463	.27	355	.21
WBL	1	1700	523	.31*	280	.16*
WBT	2	3400	447	.13	335	.10
WBR	d	1700	10	.01	4	.00
Right Turn Adjustment			EBR	.15*	NBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.67		.52

750 . Legacy Road at Warner Avenue

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	23	.01	78	.05
NBT	2	3400	45	.01*	96	.03*
NBR	1	1700	12	.01	57	.03
SBL	1	1700	69	.04*	217	.13*
SBT	2	3400	80	.02	53	.02
SBR	1	1700	130	.08	301	.18
EBL	2	3400	338	.10*	209	.06*
EBT	3	5100	842	.17	1147	.22
EBR	1	1700	107	.06	29	.02
WBL	2	3400	73	.02	18	.01
WBT	3	5100	1161	.23*	1011	.20*
WBR	1	1700	249	.15	146	.09
Right Turn Adjustment					SBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.43		.49

751 . Tustin Ranch Road at Legacy Road

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	107	.03*	80	.02
NBT	3	5100	521	.10	1393	.27*
NBR	1	1700	63	.04	82	.05
SBL	2	3400	95	.03	75	.02*
SBT	3	5100	1709	.34*	817	.16
SBR	1	1700	154	.09	63	.04
EBL	1	1700	27	.02	116	.07*
EBT	2	3400	32	.01*	63	.02
EBR	1	1700	61	.04	81	.05
WBL	1	1700	69	.04*	72	.04
WBT	2	3400	59	.02	47	.01*
WBR	1	1700	32	.02	101	.06
Right Turn Adjustment			EBR	.01*	WBR	.03*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.48		.45

752 . Legacy Road at North Loop Road

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	48	.03*	20	.01*
NBT	2	3400	54	.02	22	.01
NBR	d	1700	8	.00	7	.00
SBL	1	1700	5	.00	20	.01
SBT	2	3400	8	.00*	47	.01*
SBR	d	1700	27	.02	62	.04
EBL	1	1700	26	.02*	48	.03*
EBT	1	1700	37	.02	136	.08
EBR	1	1700	7	.00	36	.02
WBL	1	1700	5	.00	9	.01
WBT	1	1700	165	.10*	100	.06*
WBR	d	1700	21	.01	11	.01
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.20		.17

753 . Tustin Ranch Road at Edinger Avenue Conne

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	596	.12	1876	.37*
NBR	1	1700	6	.00	82	.05
SBL	1	1700	24	.01	48	.03*
SBT	3	5100	2283	.45*	1033	.20
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	117	.03*	107	.03*
WBT	0	0	0		0	
WBR	1	1700	134	.08	114	.07
Right Turn Adjustment					WBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .50

754 . Red Hill Ave. at Carnegie

P2030 Constraint With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	109	.06*	26	.02
NBT	3	5100	703	.14	2465	.48*
NBR	1	1700	315	.19	285	.17
SBL	2	3400	555	.16	273	.08*
SBT	3	5100	1324	.26*	781	.15
SBR	d	1700	121	.07	11	.01
EBL	1	1700	10	.01*	142	.08
EBT	1	1700	90	.05	325	.19*
EBR	1	1700	8	.00	61	.04
WBL	1	1700	146	.09	252	.15*
WBT	0.5	3400	411	.24*	162	{.17}
WBR	1.5		194		502	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .95

Appendix B-7 **Existing General Plan Build-out ICU Worksheets**

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline+ExistGP\EXE-193\ICU\P30GP-C-COM01-102809

10 . SR-55 Frontage Rd. SB at Paularino Av.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	787		171	
SBT	2	3200	967	.55*	711	.28*
SBR	1	1600	196	.12	301	.19
EBL	0	0	0		0	
EBT	2	3200	1143	.41*	519	.20*
EBR	0	0	175		107	
WBL	1	1600	108	.07*	302	.19*
WBT	2	3200	214	.07	869	.27
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION 1.03 .67

11 . SR-55 Frontage Rd. NB at Paularino Av.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	115		168	
NBT	2	3200	769	.28*	913	.34*
NBR	d	1600	294	.18	219	.14
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	1	1600	268	.17	164	.10*
EBT	2	3200	1666	.52*	571	.18
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	215	.07	1002	.31*
WBR	1	1600	263	.16	633	.40
Right Turn Adjustment					WBR	.09*

TOTAL CAPACITY UTILIZATION .80 .84

12 . SR-55 Frontage Rd. SB at Baker St.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	847	{.53}*	278	
SBT	2	3200	144	.31	384	.21*
SBR	1	1600	198	.12	502	.31
EBL	0	0	0		0	
EBT	1.5	4800	2010	.63*	802	.28*
EBR	1.5		257		543	
WBL	1	1600	100	.06*	374	.23*
WBT	2	3200	483	.15	1428	.45
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.05*

TOTAL CAPACITY UTILIZATION 1.22 .77

13 . SR-55 Frontage Rd. NB at Baker St.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		393	.25	382	.24
NBT	1.5	4800	426	.27*	466	.29*
NBR	0		610	.38	505	.32
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	710	.22	329	.10*
EBT	2	3200	2100	.66*	675	.21
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	267	.08	1468	.46*
WBR	1	1600	183	.11	665	.42
Right Turn Adjustment			NBR	.11*		

TOTAL CAPACITY UTILIZATION 1.04 .85

50 . Red Hill Av. at Paularino Av.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	60	.02*	267	.08*
NBT	2	3200	345	.13	806	.26
NBR	0	0	64		38	
SBL	1	1600	63	.04	13	.01
SBT	2	3200	441	.15*	978	.41*
SBR	0	0	49		324	
EBL	1	1600	163	.10	253	.16*
EBT	2	3200	1328	.48*	209	.10
EBR	0	0	203		119	
WBL	1	1600	79	.05*	114	.07
WBT	2	3200	392	.14	689	.24*
WBR	0	0	44		70	

TOTAL CAPACITY UTILIZATION .70 .89

51 . Red Hill Av. at Baker St.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	190	.06	665	.21*
NBT	2	3200	923	.32*	738	.24
NBR	0	0	90		20	
SBL	1	1600	16	.01*	7	.00
SBT	2	3200	422	.15	828	.39*
SBR	0	0	44		419	
EBL	1.5		714	{.25}*	513	.16*
EBT	1.5	4800	504	.25	173	.11
EBR	1	1600	777	.49	196	.12
WBL	1	1600	11	.01	106	.07
WBT	2	3200	46	.02*	416	.14*
WBR	0	0	13		30	
Right Turn Adjustment			EBR	.09*		

TOTAL CAPACITY UTILIZATION .69 .90

52 . Red Hill Av. at Bristol St.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	118	.04	73	.02
NBT	1.5	4800	556	.17*	186	.06*
NBR	1.5		86	.05	20	
SBL	2	3200	255	.08*	594	.19*
SBT	2	3200	149	.05	640	.20
SBR	1	1600	24	.02	376	.24
EBL	2	3200	351	.11*	185	.06*
EBT	3	4800	839	.17	601	.13
EBR	1	1600	62	.04	92	.06
WBL	2	3200	79	.02	115	.04
WBT	3	4800	437	.09*	1153	.24*
WBR	1	1600	703	.44	372	.23
Right Turn Adjustment			WBR	.29*		

TOTAL CAPACITY UTILIZATION .74 .55

541 . Bear St. at Baker St.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	62	.04	215	.13*
NBT	1	1600	138	.13*	269	.20
NBR	0	0	62		46	
SBL	2	3200	496	.16*	257	.08
SBT	1	1600	248	.16	232	.15*
SBR	2	3200	262	.08	471	.15
EBL	2	3200	433	.14	293	.09*
EBT	2	3200	1332	.47*	737	.27
EBR	0	0	176		123	
WBL	1	1600	66	.04*	75	.05
WBT	3	4800	327	.07	1514	.32*
WBR	1	1600	129	.08	197	.12

TOTAL CAPACITY UTILIZATION .80 .69

542 . Bear St. at Paularino Av.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	99	.06	26	.02
NBT	3	4800	1209	.26*	1910	.43*
NBR	0	0	28		170	
SBL	1	1600	147	.09*	174	.11*
SBT	3	4800	1054	.28	1128	.24
SBR	0	0	302		33	
EBL	1	1600	148	.09*	25	.02
EBT	1	1600	26	.04	6	.03*
EBR	0	0	37		38	
WBL	1	1600	7	.00	135	.08*
WBT	1	1600	22	.01*	21	.01
WBR	1	1600	71	.04	235	.15

TOTAL CAPACITY UTILIZATION .45 .65

545 . Bristol St. at Sunflower Av.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	3	4800	196	.04	634	.13
NBT	2.5	6400	967	{.20}*	1921	.40*
NBR	1.5		357	{.16}	196	.12
SBL	2	3200	323	.10*	179	.06*
SBT	3	4800	1270	.26	1094	.23
SBR	1	1600	147	.09	277	.17
EBL	2	3200	126	.04	356	.11
EBT	2.5	6400	1330	{.29}*	1145	.24*
EBR	1.5		604		398	{.08}
WBL	2	3200	267	.08*	328	.10*
WBT	4	6400	307	.05	620	.10
WBR	d	1600	207	.13	373	.23

TOTAL CAPACITY UTILIZATION .67 .80

546 . Bristol St. at Anton Blvd.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	84	.03*	494	.15
NBT	4	6400	1172	.18	2254	.35*
NBR	f		1271		746	
SBL	2	3200	292	.09	259	.08*
SBT	4	6400	1569	.25*	1502	.23
SBR	1	1600	23	.01	56	.04
EBL	1	1600	19	.01	106	.07
EBT	1	1600	57	.04*	86	.05*
EBR	1	1600	14	.01	198	.12
WBL	3	4800	576	.12*	1154	.24*
WBT	1	1600	33	.02	121	.08
WBR	1	1600	179	.11	363	.23

TOTAL CAPACITY UTILIZATION .44 .72

547 . Bristol St. at Paularino Av.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	28	.01	109	.03*
NBT	4	6400	1166	.20*	1594	.27
NBR	0	0	108		115	
SBL	2	3200	568	.18*	331	.10
SBT	3	4800	1180	.25	1742	.39*
SBR	0	0	28		108	
EBL	1	1600	229	.14	141	.09*
EBT	1	1600	406	.25*	174	.11
EBR	1	1600	26	.02	45	.03
WBL	2	3200	57	.02*	203	.06
WBT	1	1600	134	.08	554	.35*
WBR	1	1600	210	.13	465	.29

TOTAL CAPACITY UTILIZATION .65 .86

548 . Bristol St. at Baker St.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	67	.02	150	.05
NBT	4	6400	506	.08*	954	.15*
NBR	1	1600	217	.14	181	.11
SBL	2	3200	513	.16*	456	.14*
SBT	3	4800	615	.13	860	.18
SBR	1	1600	172	.11	590	.37
EBL	3	4800	381	.08	305	.06*
EBT	3	4800	1460	.32*	594	.14
EBR	0	0	69		75	
WBL	2	3200	116	.04*	256	.08
WBT	3	4800	281	.06	1060	.22*
WBR	1	1600	323	.20	681	.43
Right Turn Adjustment			NBR	.03*	Multi	.18*

TOTAL CAPACITY UTILIZATION .63 .75

549 . Bristol St. at Newport Blvd. SB

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	178	.06*	662	.21*
NBT	3	4800	890	.19	1360	.28
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	950	.20*	650	.14*
SBR	d	1600	272	.17	498	.31
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.17*

TOTAL CAPACITY UTILIZATION .26 .52

550 . Bristol St. at Newport Blvd. NB

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	604	.13	1450	.30*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	876	.18*	681	.14
SBR	0	0	0		0	
EBL	1.5		441	{.16}*	386	.12*
EBT	0	4800	0	.16	0	
EBR	1.5		309		203	{.01}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .34 .42

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline+ExistGP\EXE-193\ICU\P30GP-C-COM02-102809

715 . Bristol St. at I-405 NB Ramps

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6400	1980	.31*	2421	.38*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	5	8000	2245	.28	2551	.33
SBR	0	0	25		67	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	2	3200	50	.02	304	.10
WBL	1.5		109		223	
WBT	1.5	4800	86	.04*	305	.11*
WBR	2	3200	555	.17	848	.26
Right Turn Adjustment			WBR	.13*	Multi	.21*
TOTAL CAPACITY UTILIZATION				.48		.70

716 . Bristol St. at I-405 SB Ramps

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	174	.11*	276	.17*
NBT	4	6400	1474	.23	2610	.41
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	1415	.29*	1895	.39*
SBR	f		948		1349	
EBL	3	4800	700	.15*	639	.13*
EBT	0	0	0		0	
EBR	1	1600	609	.38	201	.13
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.15*		
TOTAL CAPACITY UTILIZATION				.70		.69

717 . Bear St. at SR-73 SB Ramps

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3200	383	.24*	999	.39*
NBR	0	0	437	.27	235	
SBL	2	3200	743	.23*	1175	.37*
SBT	2	3200	627	.20	1230	.38
SBR	0	0	0		0	
EBL	1.5		167	.10*	271	{.14}*
EBT	0	3200	0		0	.14
EBR	0.5		353	.22	180	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
TOTAL CAPACITY UTILIZATION				.57		.90

718 . Bear St. at SR-73 NB Ramps

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	93	.03*	317	.10*
NBT	2	3200	398	.12	751	.23
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	1107	.26*	1318	.34*
SBR	0	0	138		303	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	168	.11*	272	.17*
WBT	0	0	0		0	
WBR	2	3200	786	.25	1269	.40
Right Turn Adjustment			WBR	.01*	WBR	.07*
TOTAL CAPACITY UTILIZATION				.41		.68

721 . Flower St. at Sunflower Av.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	57	.04*	65	.04*
NBT	2	3200	220	.07	574	.18
NBR	1	1600	93	.06	91	.06
SBL	1	1600	175	.11	70	.04
SBT	2	3200	429	.17*	354	.18*
SBR	0	0	126		236	
EBL	2	3200	112	.04	241	.08*
EBT	3	4800	892	.20*	609	.15
EBR	0	0	87		110	
WBL	2	3200	94	.03*	116	.04
WBT	3	4800	308	.08	1199	.27*
WBR	0	0	68		105	

TOTAL CAPACITY UTILIZATION .44 .57

722 . Anton Blvd. at Sunflower Av.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	24	.02*	21	.01*
NBT	0	0	0		0	
NBR	2	3200	382	.12	612	.19
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	1238	.27*	678	.15
EBR	0	0	60		43	
WBL	2	3200	320	.10*	477	.15
WBT	3	4800	456	.10	1529	.32*
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.02*	NBR	.05*

TOTAL CAPACITY UTILIZATION .41 .38

726 . Main St. at Sunflower Av.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	436	.14*	1372	.43*
NBT	3	4800	333	.07	1247	.26
NBR	0	0	3		1	
SBL	1	1600	9	.01	1	.00
SBT	2	3200	925	.29*	482	.15*
SBR	1	1600	256	.16	538	.34
EBL	1.5		459	{.14}*	483	{.15}*
EBT	0.5	3200	0	.14	0	.15
EBR	2	3200	1191	.37	678	.21
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.12*	SBR	.08*

TOTAL CAPACITY UTILIZATION .69 .81

735 . Newport Blvd. NB at Del Mar Av./University Dr.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	134		181	
NBT	3	4800	1150	.27*	662	.18*
NBR	1	1600	216	.14	187	.12
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	786	.25*	447	.14*
EBT	2	3200	744	.23	673	.21
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1.5	4800	336	.16*	619	.19*
WBR	1.5		434		301	.19

TOTAL CAPACITY UTILIZATION .68 .51

736 . Newport Blvd. SB at Del Mar Av./University

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	161	.10	300	.19
SBT	3	4800	470	.10*	1424	.30*
SBR	f		491		1217	
EBL	0	0	0		0	
EBT	4	6400	1304	.21*	783	.13*
EBR	0	0	45		57	
WBL	1	1600	168	.11*	162	.10*
WBT	2	3200	322	.10	637	.20
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .42 .53

737 . Newport Blvd. NB at Mesa Dr.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	22	.01	31	.02
NBT	2	3200	508	.20*	369	.14*
NBR	0	0	129		71	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	107	.03	79	.02*
EBT	1	1600	161	.10*	259	.16
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1600	68	.07	239	.16*
WBR	0	0	36		22	

TOTAL CAPACITY UTILIZATION .30 .32

738 . Newport Blvd. SB at Mesa Dr.

P2030 Existing General Plan (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	261	.16	358	.22
SBT	4	6400	1099	.17*	2813	.44*
SBR	1	1600	0	.00	0	.00
EBL	0	0	0		0	
EBT	1	1600	0	.00*	0	.00*
EBR	1	1600	0	.00	0	.00
WBL	1	1600	80	.05*	269	.17*
WBT	1	1600	0	.00	0	.00
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .22 .61

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline+ExistGP\EXE-193\ICU\P30GP-C-IRV01-102809

42 . Red Hill Av. at Barranca Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	287	.08*	892	.26
NBT	4	6800	524	.08	2012	.30*
NBR	d	1700	81	.05	194	.11
SBL	2	3400	373	.11	339	.10*
SBT	4	6800	1233	.18*	632	.09
SBR	d	1700	197	.12	203	.12
EBL	2	3400	349	.10	286	.08*
EBT	4	6800	1417	.28*	877	.16
EBR	0	0	517	.30	223	
WBL	2	3400	390	.11*	156	.05
WBT	4	6800	726	.11	1024	.15*
WBR	1	1700	227	.13	552	.32
Right Turn Adjustment					WBR	.09*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.70		.77

43 . Red Hill Av. at Deere Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	111	.07*	34	.02
NBT	3	5100	849	.17	2785	.55*
NBR	d	1700	96	.06	32	.02
SBL	1	1700	85	.05	25	.01*
SBT	3	5100	1885	.37*	1049	.21
SBR	d	1700	112	.07	13	.01
EBL	1	1700	13	.01	93	.05
EBT	1	1700	49	.06*	73	.11*
EBR	0	0	49		115	
WBL	1	1700	16	.01*	88	.05*
WBT	1	1700	16	.01	53	.03
WBR	1	1700	28	.02	239	.14
Right Turn Adjustment					WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.56		.79

44 . Red Hill Av. at Alton Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	175	.10*	53	.03
NBT	3	5100	936	.26	2362	.53*
NBR	0	0	396		321	
SBL	1	1700	217	.13	152	.09*
SBT	3	5100	1654	.32*	1093	.21
SBR	d	1700	111	.07	24	.01
EBL	1	1700	10	.01	48	.03
EBT	2	3400	59	.02*	217	.06*
EBR	1	1700	60	.04	156	.09
WBL	2	3400	361	.11*	531	.16*
WBT	1	1700	174	.10	153	.09
WBR	1	1700	66	.04	490	.29
Right Turn Adjustment					WBR	.03*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.60		.92

45 . Red Hill Av. at McGaw Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	623	.18*	176	.05
NBT	3	5100	1405	.28	2199	.43*
NBR	1	1700	305	.18	173	.10
SBL	2	3400	362	.11	92	.03*
SBT	3	5100	1532	.30*	1703	.33
SBR	d	1700	101	.06	105	.06
EBL	1	1700	30	.02*	131	.08
EBT	2	3400	53	.03	165	.10*
EBR	0	0	116	.07	435	.26
WBL	2	3400	202	.06	333	.10*
WBT	2	3400	135	.07*	89	.05
WBR	0	0	95		309	.18
Right Turn Adjustment					Multi	.10*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.62		.81

47 . Red Hill Av. at MacArthur Blvd.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	104	.06	425	.25*
NBT	3	5100	1089	.22*	1197	.25
NBR	0	0	58		90	
SBL	2	3400	363	.11*	629	.19
SBT	3	5100	1055	.21	1003	.20*
SBR	f		422		1342	
EBL	2	3400	1233	.36*	765	.23*
EBT	3	5100	779	.15	321	.06
EBR	d	1700	197	.12	165	.10
WBL	1	1700	87	.05	102	.06
WBT	3	5100	495	.10*	852	.17*
WBR	f		718		818	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .84 .90

48 . Red Hill Av. at Sky Park N

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	38	.02	35	.02
NBT	3	5100	1117	.22*	1351	.26*
NBR	d	1700	82	.05	37	.02
SBL	1	1700	164	.10*	91	.05*
SBT	3	5100	978	.19	1113	.22
SBR	d	1700	141	.08	63	.04
EBL	1	1700	31	.02*	86	.05*
EBT	1	1700	35	.02	32	.02
EBR	1	1700	25	.01	52	.03
WBL	1	1700	17	.01	105	.06
WBT	1	1700	21	.07*	83	.20*
WBR	0	0	102		253	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .46 .61

49 . Red Hill Av. at Main St.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	250	.07	440	.13
NBT	2	3400	926	.27*	1001	.29*
NBR	1	1700	387	.23	269	.16
SBL	2	3400	166	.05*	232	.07*
SBT	2	3400	592	.17	733	.22
SBR	f		213		545	
EBL	2	3400	352	.10	323	.10*
EBT	3	5100	1657	.39*	1250	.32
EBR	0	0	345		397	
WBL	2	3400	153	.05*	360	.11
WBT	3	5100	527	.13	1644	.35*
WBR	0	0	121		156	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .81 .86

70 . Gillette Av. at Main St.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	56	.02*	262	.08
NBT	1	1700	5	.00	41	.02*
NBR	1	1700	39	.02	487	.29
SBL	2	3400	57	.02	300	.09*
SBT	1	1700	30	.02*	17	.01
SBR	d	1700	53	.03	293	.17
EBL	2	3400	395	.12*	159	.05*
EBT	4	6800	1328	.20	1393	.20
EBR	f		320		70	
WBL	2	3400	252	.07	73	.02
WBT	3	5100	923	.24*	1235	.25*
WBR	0	0	292		60	
Right Turn Adjustment					Multi	.29*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .75

71 . Armstrong St. at Barranca Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	36	.02*	238	.14
NBT	1	1700	37	.02	280	.16*
NBR	1	1700	58	.03	292	.17
SBL	1	1700	137	.08	129	.08*
SBT	1	1700	171	.10*	116	.07
SBR	1	1700	83	.05	105	.06
EBL	1	1700	86	.05	111	.07*
EBT	4	6800	1175	.17*	1055	.16
EBR	d	1700	165	.10	107	.06
WBL	1	1700	324	.19*	154	.09
WBT	4	6800	1492	.24	1194	.20*
WBR	0	0	167		159	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .56

77 . MacArthur Bl. at Sky Park E.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	113	.07*	92	.05
NBT	3	5100	1167	.23	1680	.33*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6800	1202	.20*	958	.15
SBR	0	0	147		68	
EBL	2	3400	33	.01*	160	.05*
EBT	0	0	0		0	
EBR	1	1700	68	.04	262	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .33 .43

78 . MacArthur Bl. at Main St.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	850	.25*	855	.25*
NBT	4	6800	921	.14	1244	.18
NBR	f		1443		561	
SBL	2	3400	430	.13	236	.07
SBT	4	6800	811	.12*	1136	.17*
SBR	1	1700	101	.06	97	.06
EBL	1	1700	110	.06	84	.05
EBT	3	5100	807	.16*	675	.13*
EBR	1	1700	575	.34	781	.46
WBL	2	3400	304	.09*	755	.22*
WBT	3	5100	439	.09	760	.15
WBR	f		168		565	
Right Turn Adjustment					EBR	.08*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .67 .90

79 . MacArthur Bl. at I-405 NB Ramps

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	2421	.36*	2278	.34*
NBR	2	3400	235	.07	1019	.30
SBL	2	3400	225	.07*	641	.19*
SBT	4	6800	1608	.24	2002	.29
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	1077	.32*	618	.18*
WBT	0	0	0		0	
WBR	2	3400	764	.22	302	.09
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .80 .76

80 . MacArthur Bl. at I-405 SB Ramps

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1474	.22*	2655	.39*
NBR	1	1700	352	.21	743	.44
SBL	2	3400	228	.07*	617	.18*
SBT	4	6800	1813	.27	1610	.24
SBR	1	1700	624	.37	463	.27
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	1027	.30*	690	.20*
WBT	1	1700	246	.14	297	.17
WBR	f		1126		615	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .64 .82

82 . MacArthur Bl. at Michelson Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	254	.15*	179	.11
NBT	4	6800	1246	.18	1778	.26*
NBR	1	1700	306	.18	124	.07
SBL	2	3400	541	.16	860	.25*
SBT	4	6800	2208	.32*	1946	.29
SBR	0	0	0		0	
EBL	2	3400	292	.09*	480	.14
EBT	2	3400	213	.08	216	.10*
EBR	0	0	47		114	
WBL	2	3400	135	.04	554	.16*
WBT	1	1700	156	.09*	121	.07
WBR	1	1700	322	.19	856	.50
Right Turn Adjustment					WBR	.13*
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for WBR						

TOTAL CAPACITY UTILIZATION .70 .95

83 . MacArthur Bl. at Douglas Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1577	.24*	1569	.24
NBR	0	0	72		62	
SBL	2	3400	479	.14*	278	.08
SBT	4	6800	1754	.26	2276	.33*
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	40	.02*	64	.04*
WBT	0	0	0		0	
WBR	1	1700	187	.11	401	.24
Right Turn Adjustment					WBR	.13*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .55

87 . Dupont Dr. at Michelson Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	114	.07*	312	.18*
NBT	2	3400	59	.03	122	.07
NBR	0	0	48		125	.07
SBL	1	1700	61	.04	125	.07
SBT	2	3400	39	.02*	71	.04*
SBR	0	0	51	.03	114	.07
EBL	1	1700	76	.04	108	.06*
EBT	2	3400	801	.34*	583	.20
EBR	0	0	342		91	
WBL	1	1700	40	.02*	48	.03
WBT	3	5100	455	.12	1029	.23*
WBR	0	0	135		140	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .50 .56

97 . Von Karman Av. at Barranca Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	199	.06*	478	.14*
NBT	2	3400	239	.07	434	.13
NBR	d	1700	202	.12	721	.42
SBL	2	3400	140	.04	254	.07
SBT	2	3400	584	.17*	438	.13*
SBR	2	3400	136	.04	171	.05
EBL	2	3400	91	.03	78	.02
EBT	3	5100	690	.14*	1116	.22*
EBR	1	1700	320	.19	219	.13
WBL	2	3400	669	.20*	244	.07*
WBT	4	6800	1378	.20	851	.13
WBR	1	1700	181	.11	87	.05
Right Turn Adjustment					NBR	.17*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.62		.78

98 . Von Karman Av. at Alton Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	80	.05*	183	.11
NBT	2	3400	566	.17	1206	.35*
NBR	d	1700	80	.05	412	.24
SBL	1	1700	58	.03	284	.17*
SBT	2	3400	1134	.33*	537	.16
SBR	d	1700	46	.03	119	.07
EBL	1	1700	63	.04*	68	.04
EBT	2	3400	382	.11	955	.28*
EBR	d	1700	78	.05	116	.07
WBL	1	1700	347	.20	127	.07*
WBT	2	3400	975	.29*	628	.18
WBR	d	1700	221	.13	125	.07
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.76		.92

99 . Von Karman Av. at McGaw Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	74	.04*	45	.03
NBT	2	3400	611	.18	1997	.59*
NBR	d	1700	63	.04	134	.08
SBL	1	1700	72	.04	58	.03*
SBT	2	3400	1368	.40*	669	.20
SBR	d	1700	52	.03	44	.03
EBL	1	1700	23	.01	100	.06
EBT	2	3400	255	.09*	558	.19*
EBR	0	0	63		84	
WBL	1	1700	189	.11*	37	.02*
WBT	2	3400	465	.16	271	.12
WBR	0	0	66		123	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.69		.88

100 . Von Karman Av. at Main St.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	155	.05*	381	.11
NBT	2	3400	522	.15	1176	.35*
NBR	1	1700	115	.07	313	.18
SBL	1	1700	95	.06	179	.11*
SBT	2	3400	1248	.37*	727	.21
SBR	1	1700	270	.16	224	.13
EBL	2	3400	400	.12*	529	.16
EBT	3	5100	690	.14	1638	.32*
EBR	f		394		182	
WBL	2	3400	369	.11	141	.04*
WBT	3	5100	1035	.23*	795	.18
WBR	0	0	129		104	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.82		.87

101 . Von Karman Av. at Morse Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	276	.08*	90	.03
NBT	2	3400	774	.26	1538	.46*
NBR	0	0	112		13	
SBL	1	1700	150	.09	35	.02*
SBT	2	3400	1326	.39*	956	.28
SBR	f		162		39	
EBL	1	1700	16	.01*	64	.04*
EBT	1	1700	8	.00	2	.00
EBR	f		55		274	
WBL	1	1700	9	.01	90	.05
WBT	1	1700	1	.02*	12	.11*
WBR	0	0	40		169	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .68

102 . Von Karman Av. at Michelson Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	63	.04	69	.04*
NBT	2	3400	999	.29*	1034	.30
NBR	1	1700	107	.06	110	.06
SBL	1	1700	209	.12*	290	.17
SBT	2	3400	781	.27	1498	.50*
SBR	0	0	141		205	
EBL	2	3400	190	.06	232	.07
EBT	2	3400	274	.10*	581	.20*
EBR	0	0	56		109	
WBL	1	1700	244	.14*	213	.13*
WBT	2	3400	546	.16	766	.23
WBR	f		440		414	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .70 .92

103 . Von Karman Av. at Dupont Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	98	.06	76	.04*
NBT	2	3400	1168	.36*	1076	.36
NBR	0	0	53		131	
SBL	1	1700	109	.06*	110	.06
SBT	2	3400	858	.25	1487	.44*
SBR	1	1700	43	.03	40	.02
EBL	1	1700	7	.00	18	.01
EBT	2	3400	138	.07*	209	.11*
EBR	0	0	85		164	
WBL	1	1700	117	.07*	99	.06*
WBT	2	3400	179	.09	314	.14
WBR	0	0	115		175	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .70

104 . Von Karman Av. at Martin

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	34	.02	36	.02*
NBT	2	3400	1052	.31*	1063	.31
NBR	1	1700	18	.01	29	.02
SBL	1	1700	36	.02*	28	.02
SBT	2	3400	751	.30	1464	.50*
SBR	0	0	255		239	
EBL	2	3400	206	.06*	196	.06*
EBT	1	1700	6	.03	3	.03
EBR	0	0	50		52	
WBL	1	1700	2	.00	24	.01
WBT	1	1700	2	.00*	15	.04*
WBR	0	0	6		51	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .44 .67

112 . Myford Rd. at Michelle Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	56	.03*	36	.02
NBT	2	3400	64	.04	368	.18*
NBR	0	0	59		236	
SBL	1	1700	123	.07	110	.06*
SBT	2	3400	297	.12*	83	.03
SBR	0	0	110		18	
EBL	1	1700	7	.00	65	.04
EBT	2	3400	57	.02	372	.11*
EBR	d	1700	16	.01	32	.02
WBL	1	1700	87	.05	51	.03*
WBT	2	3400	294	.10*	102	.06
WBR	0	0	39		107	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .30 .43

113 . Myford Rd. at Walnut Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	9	.01*	114	.07
NBT	1	1700	5	.00	120	.07*
NBR	f		66		292	
SBL	2	3400	107	.03	138	.04*
SBT	1	1700	34	.02*	11	.01
SBR	1	1700	246	.14	133	.08
EBL	1	1700	76	.04	77	.05*
EBT	2	3400	887	.26*	830	.24
EBR	d	1700	54	.03	11	.01
WBL	2	3400	323	.10*	38	.01
WBT	2	3400	845	.25	1093	.32*
WBR	1	1700	149	.09	123	.07
Right Turn Adjustment			SBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .48 .53

114 . Millikan Av. at Barranca Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	96	.06*	51	.03
NBT	2	3400	34	.01	29	.01*
NBR	d	1700	70	.04	479	.28
SBL	2	3400	53	.02	276	.08*
SBT	0.5	3400	39	.02*	56	.03
SBR	1.5		39	.02	36	
EBL	2	3400	41	.01*	40	.01
EBT	3	5100	648	.13	1739	.34*
EBR	d	1700	228	.13	81	.05
WBL	1	1700	213	.13	84	.05*
WBT	4	6800	1804	.27*	908	.13
WBR	1	1700	175	.10	601	.35
Right Turn Adjustment					NBR	.23*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .41 .76

115 . Millikan Av. at Alton Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	15	.01	36	.02
NBT	1	1700	12	.01*	44	.03*
NBR	1	1700	33	.02	91	.05
SBL	1	1700	75	.04*	121	.07*
SBT	1	1700	31	.02	17	.01
SBR	1	1700	156	.09	162	.10
EBL	1	1700	110	.06*	207	.12
EBT	2	3400	352	.10	1099	.32*
EBR	d	1700	31	.02	27	.02
WBL	1	1700	138	.08	46	.03*
WBT	2	3400	989	.29*	603	.18
WBR	d	1700	177	.10	109	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .50

116 . Cartwright Rd. at Main St.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	32	.02*	102	.06*
NBT	1	1700	1	.00	2	.00
NBR	1	1700	36	.02	296	.17
SBL	2	3400	8	.00	96	.03
SBT	1	1700	4	.01*	5	.04*
SBR	0	0	18		59	
EBL	1	1700	53	.03*	19	.01
EBT	3	5100	651	.15	2048	.41*
EBR	0	0	114		44	
WBL	2	3400	265	.08	71	.02*
WBT	3	5100	1541	.32*	1179	.23
WBR	0	0	77		9	
Right Turn Adjustment					NBR	.08*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.43		.66

119 . Teller Av. at Michelson Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	81	.05	180	.11*
NBT	1	1700	16	.01*	0	.00
NBR	1	1700	34	.02	459	.27
SBL	1	1700	312	.18*	198	.12
SBT	1	1700	158	.09	59	.03*
SBR	1	1700	309	.18	153	.09
EBL	1	1700	31	.02	190	.11*
EBT	3	5100	355	.07*	1028	.20
EBR	1	1700	184	.11	188	.11
WBL	1	1700	518	.30*	35	.02
WBT	3	5100	1500	.29	790	.15*
WBR	1	1700	84	.05	81	.05
Right Turn Adjustment					NBR	.20*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.61		.65

126 . Jamboree Rd. at Bryan Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	116	.03*	271	.08
NBT	4	6800	673	.10	2052	.30*
NBR	1	1700	176	.10	431	.25
SBL	2	3400	357	.11	83	.02*
SBT	4	6800	2407	.35*	954	.14
SBR	d	1700	134	.08	200	.12
EBL	2	3400	66	.02	237	.07
EBT	2	3400	448	.13*	546	.16*
EBR	d	1700	209	.12	118	.07
WBL	2	3400	544	.16*	348	.10*
WBT	2	3400	560	.16	599	.18
WBR	1	1700	271	.16	242	.14
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.72		.63

127 . Jamboree Rd. at El Camino Real

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	268	.08*	460	.14
NBT	4	6800	784	.12	1753	.26*
NBR	1	1700	579	.34	308	.18
SBL	1	1700	219	.13	125	.07*
SBT	4	6800	2590	.38*	973	.14
SBR	1	1700	160	.09	201	.12
EBL	1	1700	81	.05	220	.13
EBT	1	1700	156	.09*	197	.12*
EBR	2	3400	194	.06	323	.10
WBL	2	3400	367	.11*	723	.21*
WBT	2	3400	84	.04	260	.14
WBR	0	0	68		207	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.71		.71

128 . Jamboree Rd. at I-5 NB Ramps

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1284	.19	2632	.39*
NBR	f		670		710	
SBL	0	0	0		0	
SBT	4	6800	1915	.28*	1713	.25
SBR	f		470		480	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		1135	.33*	377	.22*
WBT	0	5100	0		0	
WBR	1.5		516	.30	998	.29
Right Turn Adjustment					WBR	.07*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .73

129 . Jamboree Rd. at I-5 SB Ramps

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1495	.22	2560	.38*
NBR	f		379		1092	
SBL	0	0	0		0	
SBT	4	6800	2271	.33*	1579	.23
SBR	f		625		511	
EBL	2	3400	452	.13*	695	.20*
EBT	0	0	0		0	
EBR	2	3400	978	.29	794	.23
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.16*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .63

130 . Jamboree Rd. at Michelle Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	376	.22*	273	.16*
NBT	4	6800	1420	.21	3077	.45
NBR	d	1700	0	.00	0	.00
SBL	1	1700	0	.00	0	.00
SBT	4	6800	3353	.49*	2141	.31*
SBR	d	1700	559	.33	297	.17
EBL	2	3400	138	.04*	551	.16*
EBT	0.5	3400	20	{.01}	40	{.06}
EBR	1.5		214		351	
WBL	1	1700	3	.00	8	.00
WBT	1	1700	5	.00*	10	.01*
WBR	0	0	2		12	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .80 .69

131 . Jamboree Rd. SB at Walnut Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	456	.13	382	.11
SBT	2	3400	776	.23*	749	.22*
SBR	1	1700	328	.19	183	.11
EBL	0	0	0		0	
EBT	3	5100	474	.09*	608	.12*
EBR	1	1700	226	.13	366	.22
WBL	2	3400	298	.09*	305	.09*
WBT	3	5100	452	.09	837	.16
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.04*	EBR	.10*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .50 .58

132 . Jamboree Rd. NB at Walnut Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	280	.08	600	.18
NBT	2	3400	446	.13*	672	.20*
NBR	d	1700	343	.20	528	.31
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3400	39	.01	219	.06*
EBT	3	5100	891	.17*	832	.16
EBR	0	0	0		0	
WBL	0	0	4		0	
WBT	3	5100	823	.16	920	.18*
WBR	1	1700	508	.30	609	.36
Right Turn Adjustment			Multi	.21*	Multi	.23*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.56		.72

133 . Jamboree Rd. at Edinger Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	76	.02	195	.06
NBT	0	0	0		0	
NBR	1	1700	124	.07	386	.23
SBL	2	3400	534	.16*	558	.16*
SBT	0	0	0		0	
SBR	f		1019		394	
EBL	2	3400	291	.09*	719	.21*
EBT	3	5100	932	.19	906	.19
EBR	0	0	12		78	
WBL	2	3400	218	.06	182	.05
WBT	3	5100	1174	.23*	1050	.21*
WBR	1	1700	579	.34	451	.27
Right Turn Adjustment					NBR	.06*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.53		.69

134 . Loop Rd. at Warner Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	24	.01	82	.05
NBT	2	3400	7	.00*	200	.06*
NBR	1	1700	88	.05	452	.27
SBL	1	1700	158	.09*	193	.11*
SBT	2	3400	142	.04	267	.08
SBR	f		1037		301	
EBL	2	3400	43	.01	43	.01
EBT	2	3400	884	.26*	2115	.62*
EBR	1	1700	90	.05	30	.02
WBL	2	3400	148	.04*	342	.10*
WBT	2	3400	869	.26	773	.23
WBR	1	1700	10	.01	32	.02
Right Turn Adjustment			NBR	.02*	NBR	.13*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.46		1.07

136 . Jamboree Rd. at Barranca Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	206	.06*	280	.08
NBT	4	6800	1188	.17	3271	.48*
NBR	f		140		276	
SBL	2	3400	423	.12	407	.12*
SBT	4	6800	3379	.50*	1690	.25
SBR	f		1201		385	
EBL	2.5		203	.06	1149	
EBT	2.5	8500	607	.12*	847	.23*
EBR	1	1700	102	.06	134	.08
WBL	2	3400	259	.08	276	.08
WBT	3	5100	843	.17*	914	.18*
WBR	f		219		510	
Clearance Interval			.05*		.05*	

Note: Assumes E/W Split Phasing

TOTAL CAPACITY UTILIZATION .90 1.06

137 . Jamboree Rd. at Beckman Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	38	.02*	15	.01
NBT	4	6800	1424	.23	3599	.53*
NBR	0	0	121		32	
SBL	1	1700	66	.04	35	.02*
SBT	4	6800	3549	.55*	2041	.31
SBR	0	0	190		57	
EBL	1	1700	83	.05*	263	.15*
EBT	1	1700	13	.01	23	.01
EBR	d	1700	6	.00	14	.01
WBL	1	1700	85	.05	55	.03
WBT	1	1700	32	.05*	18	.04*
WBR	0	0	53		48	
Clearance Interval			.05*		.05*	

TOTAL CAPACITY UTILIZATION .72 .79

138 . Jamboree Rd. at Alton Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	316	.09*	241	.07
NBT	5	8500	1224	.14	3074	.36*
NBR	1	1700	197	.12	226	.13
SBL	2	3400	227	.07	223	.07*
SBT	4	6800	3035	.49*	1850	.30
SBR	0	0	297		184	
EBL	2	3400	81	.02*	228	.07
EBT	3	5100	296	.07	1252	.28*
EBR	0	0	84		183	
WBL	2	3400	191	.06	277	.08*
WBT	3	5100	928	.18*	555	.11
WBR	d	1700	185	.11	209	.12
Clearance Interval			.05*		.05*	

TOTAL CAPACITY UTILIZATION .83 .84

139 . Jamboree Rd. at McGaw Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	256	.08*	106	.03
NBT	4	6800	1644	.25	3230	.49*
NBR	0	0	43		77	
SBL	2	3400	28	.01	26	.01*
SBT	4	6800	2831	.47*	2108	.32
SBR	0	0	337		63	
EBL	1	1700	58	.03*	297	.17*
EBT	2	3400	59	.03	228	.13
EBR	0	0	44		234	.14
WBL	1	1700	45	.03	51	.03
WBT	2	3400	147	.05*	60	.03*
WBR	0	0	28		38	
Clearance Interval			.05*		.05*	

TOTAL CAPACITY UTILIZATION .68 .75

140 . Jamboree Rd. at Kelvin Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	225	.13*	154	.09
NBT	4	6800	1789	.29	3394	.54*
NBR	0	0	185		295	
SBL	1	1700	11	.01	14	.01*
SBT	4	6800	3243	.48*	2616	.38
SBR	d	1700	27	.02	34	.02
EBL	1	1700	37	.02	36	.02
EBT	1	1700	14	.01*	20	.01*
EBR	d	1700	129	.08	185	.11
WBL	1	1700	148	.09*	159	.09*
WBT	1	1700	18	.02	22	.02
WBR	0	0	14		11	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .70

141 . Jamboree Rd. at Main St.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	743	.22*	590	.17*
NBT	4	6800	1943	.29	2817	.41
NBR	f		226		469	
SBL	2	3400	457	.13	343	.10
SBT	4	6800	2566	.38*	2512	.37*
SBR	1	1700	626	.37	230	.14
EBL	2	3400	155	.05	546	.16
EBT	3	5100	308	.06*	1259	.25*
EBR	f		286		815	
WBL	2	3400	701	.21*	597	.18*
WBT	3	5100	724	.14	401	.08
WBR	f		104		331	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .92 1.02

143 . Jamboree Rd. at I-405 NB Ramps

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	2078	.41*	3650	.72*
NBR	f		600		1131	
SBL	0	0	0		0	
SBT	4	6800	1972	.29	2736	.40
SBR	f		1700		1221	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	3	5100	1438	.28*	768	.15*
WBT	0	0	0		0	
WBR	f		1092		244	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .92

144 . Jamboree Rd. at I-405 SB Ramps

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1828	.27	3314	.49*
NBR	f		601		1160	
SBL	0	0	0		0	
SBT	4	6800	3101	.46*	3026	.45
SBR	f		280		710	
EBL	1.5		845	{.43}*	1406	.41*
EBT	0	6800	0	.43	0	
EBR	2.5		2085		1184	.35
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .94 .95

145 . Jamboree Rd. at Michelson Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	148	.09*	73	.04
NBT	4	6800	1435	.21	2587	.38*
NBR	f		249		602	
SBL	2	3400	942	.28	1265	.37*
SBT	4	6800	2852	.42*	2137	.31
SBR	f		562		492	
EBL	2	3400	321	.09	1095	.32*
EBT	2	3400	349	.13*	393	.16
EBR	0	0	91		164	
WBL	2	3400	438	.13*	419	.12
WBT	2	3400	550	.16	385	.11*
WBR	f		704		1018	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.82		1.23

146 . Jamboree Rd. at Dupont Rd.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	265	.16*	141	.08
NBT	4	6800	1554	.23	2501	.37*
NBR	1	1700	31	.02	45	.03
SBL	1	1700	119	.07	250	.15*
SBT	3	5100	2328	.46*	2198	.43
SBR	d	1700	495	.29	284	.17
EBL	1	1700	81	.05*	389	.23*
EBT	2	3400	41	.02	95	.06
EBR	0	0	59	.03	337	.20
WBL	1	1700	44	.03	75	.04
WBT	2	3400	70	.04*	65	.04*
WBR	0	0	145	.09	120	.07
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.76		.84

164 . Construction S. at Barranca Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	26	.02*	337	.20*
NBT	1	1700	13	.01	19	.18
NBR	0	0	11		294	
SBL	1	1700	39	.02	47	.03
SBT	1	1700	60	.04*	29	.02*
SBR	1	1700	130	.08	134	.08
EBL	1	1700	192	.11	139	.08*
EBT	3	5100	940	.18*	1389	.27
EBR	1	1700	104	.06	21	.01
WBL	1	1700	266	.16*	81	.05
WBT	3	5100	984	.19	1489	.29*
WBR	d	1700	45	.03	42	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.45		.64

168 . Murphy Av. at Alton Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	30	.02	83	.05
NBT	1	1700	20	.05*	142	.32*
NBR	0	0	71		395	
SBL	1	1700	26	.02*	106	.06*
SBT	1	1700	41	.04	48	.10
SBR	0	0	32		126	
EBL	1	1700	121	.07*	56	.03
EBT	3	5100	508	.10	1559	.31*
EBR	d	1700	67	.04	38	.02
WBL	1	1700	184	.11	94	.06*
WBT	3	5100	1338	.26*	810	.16
WBR	d	1700	121	.07	22	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.45		.80

170 . Union at Main St.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	153	.05*	654	.19*
NBT	1	1700	4	.01	8	.05
NBR	0	0	13		72	
SBL	1	1700	13	.01	41	.02
SBT	1	1700	3	.00*	2	.00*
SBR	1	1700	35	.02	47	.03
EBL	2	3400	109	.03*	117	.03
EBT	3	5100	514	.10	1877	.37*
EBR	f		338		128	
WBL	2	3400	70	.02	40	.01*
WBT	3	5100	1412	.28*	618	.13
WBR	0	0	7		25	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .41 .62

171 . Veneto at Main St.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	239	.07*	161	.05
NBT	1	1700	6	.02	24	.12*
NBR	0	0	24		184	
SBL	1	1700	43	.03	30	.02*
SBT	1	1700	12	.05*	7	.02
SBR	0	0	75		23	
EBL	1	1700	25	.01*	106	.06
EBT	3	5100	325	.08	1726	.36*
EBR	0	0	60		89	
WBL	2	3400	80	.02	44	.01*
WBT	3	5100	1080	.22*	415	.09
WBR	0	0	19		40	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .40 .56

174 . Carlson Av. at Michelson Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	444	.13*	120	.04*
NBT	2	3400	199	.06	109	.03
NBR	1	1700	247	.15	432	.25
SBL	2	3400	60	.02	200	.06
SBT	1	1700	40	.02*	198	.12*
SBR	f		289		684	
EBL	2	3400	670	.20*	620	.18
EBT	2	3400	825	.24	1228	.36*
EBR	1	1700	78	.05	414	.24
WBL	1	1700	273	.16	367	.22*
WBT	2	3400	1011	.30*	1006	.30
WBR	f		163		221	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .70 .79

175 . Carlson Av. at Campus Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	252	.15*	327	.19*
SBT	0	0	2		0	
SBR	1	1700	368	.22	243	.14
EBL	1	1700	192	.11*	387	.23*
EBT	2	3400	1022	.30	1603	.47
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	1457	.43*	1247	.37*
WBR	d	1700	200	.12	243	.14
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .84

180 . Harvard Av. at Walnut Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	308	.09*	377	.11*
NBT	1	1700	69	.04	71	.04
NBR	d	1700	154	.09	223	.13
SBL	1	1700	191	.11	120	.07
SBT	1	1700	121	.07*	52	.03*
SBR	1	1700	147	.09	67	.04
EBL	1	1700	40	.02*	125	.07
EBT	2	3400	545	.16	831	.24*
EBR	1	1700	325	.19	333	.20
WBL	1	1700	134	.08	187	.11*
WBT	2	3400	1035	.30*	809	.24
WBR	d	1700	111	.07	44	.03
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.53		.54

181 . Harvard Av. at Edinger Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	267	.08	314	.09
NBT	2	3400	214	.06*	525	.15*
NBR	1	1700	139	.08	308	.18
SBL	1	1700	245	.14*	128	.08*
SBT	2	3400	418	.12	249	.07
SBR	d	1700	138	.08	96	.06
EBL	2	3400	100	.03*	175	.05*
EBT	3	5100	1226	.24	1254	.25
EBR	1	1700	279	.16	128	.08
WBL	2	3400	324	.10	114	.03
WBT	3	5100	1455	.31*	1490	.32*
WBR	0	0	106		149	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.59		.65

182 . Harvard Av. at Paseo Westpark

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	127	.07*	0	.00
NBT	2	3400	292	.09	1005	.30*
NBR	d	1700	42	.02	124	.07
SBL	1	1700	48	.03	32	.02*
SBT	2	3400	856	.25*	444	.13
SBR	1	1700	173	.10	105	.06
EBL	1	1700	70	.04	97	.06
EBT	1	1700	110	.06*	177	.10*
EBR	d	1700	0	.00	0	.00
WBL	1	1700	214	.13*	78	.05*
WBT	1	1700	0	.00	105	.06
WBR	d	1700	278	.16	123	.07
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.56		.52

183 . Harvard Av. at Warner Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	123	.07*	275	.16
NBT	2	3400	243	.07	1058	.31*
NBR	d	1700	75	.04	137	.08
SBL	1	1700	155	.09	77	.05*
SBT	2	3400	985	.29*	422	.12
SBR	d	1700	190	.11	91	.05
EBL	1	1700	170	.10*	269	.16*
EBT	2	3400	420	.12	656	.19
EBR	d	1700	159	.09	124	.07
WBL	1	1700	116	.07	74	.04
WBT	2	3400	647	.19*	594	.17*
WBR	d	1700	87	.05	113	.07
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.70		.74

184 . Harvard Av. at Barranca Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	161	.09*	333	.20
NBT	2	3400	356	.10	1156	.34*
NBR	1	1700	74	.04	133	.08
SBL	1	1700	178	.10	101	.06*
SBT	2	3400	888	.26*	438	.13
SBR	1	1700	224	.13	70	.04
EBL	2	3400	57	.02*	174	.05
EBT	3	5100	489	.10	1129	.22*
EBR	1	1700	184	.11	264	.16
WBL	2	3400	219	.06	130	.04*
WBT	3	5100	1105	.23*	890	.20
WBR	0	0	87		142	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .71

185 . Harvard Av. at Alton Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	331	.10*	167	.05
NBT	2	3400	428	.13	1302	.38*
NBR	d	1700	101	.06	180	.11
SBL	1	1700	43	.03	92	.05*
SBT	2	3400	1000	.29*	568	.17
SBR	1	1700	316	.19	120	.07
EBL	2	3400	99	.03*	368	.11
EBT	3	5100	307	.06	1200	.24*
EBR	1	1700	144	.08	320	.19
WBL	2	3400	219	.06	183	.05*
WBT	3	5100	1078	.22*	544	.12
WBR	0	0	44		65	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .77

186 . Harvard Av. at Main St.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	114	.03*	128	.04
NBT	2	3400	416	.12	1195	.35*
NBR	1	1700	84	.05	327	.19
SBL	2	3400	68	.02	39	.01*
SBT	2	3400	1071	.32*	795	.23
SBR	1	1700	514	.30	167	.10
EBL	2	3400	155	.05*	740	.22
EBT	3	5100	209	.06	1394	.33*
EBR	0	0	88		286	
WBL	2	3400	401	.12	140	.04*
WBT	3	5100	752	.16*	205	.05
WBR	0	0	39		25	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .78

187 . Harvard Av. at Coronado

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	185	.05*	218	.06
NBT	2	3400	508	.15	1456	.44*
NBR	0	0	10		41	
SBL	1	1700	30	.02	69	.04*
SBT	2	3400	1360	.40*	1014	.30
SBR	d	1700	166	.10	71	.04
EBL	2	3400	45	.01*	93	.03
EBT	1	1700	1	.00	60	.04*
EBR	d	1700	155	.09	268	.16
WBL	1	1700	35	.02	18	.01*
WBT	1	1700	9	.01*	11	.01
WBR	1	1700	87	.05	52	.03
Right Turn Adjustment			EBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .58

188 . Harvard Av. at Michelson Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	131	.08*	119	.07
NBT	2	3400	319	.10	1020	.33*
NBR	0	0	30		110	
SBL	1	1700	147	.09	319	.19*
SBT	2	3400	852	.25*	641	.19
SBR	1	1700	510	.30	361	.21
EBL	2	3400	169	.05*	471	.14*
EBT	2	3400	334	.10	991	.29
EBR	f		86		157	
WBL	1	1700	144	.08	92	.05
WBT	2	3400	772	.27*	500	.20*
WBR	0	0	154		169	
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .71 .91

189 . Harvard Av. at University Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	111	.07*	109	.06
NBT	2	3400	300	.09	694	.20*
NBR	d	1700	79	.05	295	.17
SBL	1	1700	19	.01	77	.05*
SBT	2	3400	605	.18*	568	.17
SBR	d	1700	416	.24	290	.17
EBL	1	1700	136	.08*	548	.32*
EBT	3	5100	762	.16	2037	.42
EBR	0	0	75		99	
WBL	1	1700	210	.12	173	.10
WBT	3	5100	2383	.48*	1080	.22*
WBR	0	0	84		37	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .86 .84

190 . University Dr. at Campus Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	226	.07*	339	.10
NBT	3	5100	669	.13	1656	.32*
NBR	1	1700	492	.29	437	.26
SBL	2	3400	141	.04	107	.03*
SBT	3	5100	2023	.40*	1129	.22
SBR	1	1700	442	.26	158	.09
EBL	2	3400	338	.10*	572	.17*
EBT	2	3400	847	.25	997	.29
EBR	d	1700	31	.02	172	.10
WBL	2	3400	36	.01	279	.08
WBT	2	3400	771	.23*	1043	.31*
WBR	d	1700	213	.13	132	.08
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .85 .88

191 . Mesa Rd. at University Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	56	.03*	337	.20*
NBT	0	0	0		0	
NBR	1	1700	93	.05	276	.16
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1330	.26	2294	.45*
EBR	1	1700	268	.16	124	.07
WBL	1	1700	244	.14	196	.12*
WBT	3	5100	2019	.40*	1353	.27
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .48 .82

192 . California Av. at University Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	230	.07*	754	.22*
NBT	0	0	0		0	
NBR	1	1700	239	.14	906	.53
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1454	.29*	1479	.29*
EBR	1	1700	870	.51	422	.25
WBL	2	3400	834	.25*	239	.07*
WBT	3	5100	1283	.25	1500	.29
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.17*	NBR	.26*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.83		.89

193 . MacArthur Blvd. NB at University Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	34	.02*	13	.01*
NBT	0	0	0		0	
NBR	1	1700	331	.19	324	.19
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	2005	.39*	1546	.30*
EBR	d	1700	152	.09	114	.07
WBL	2	3400	599	.18*	1256	.37*
WBT	3	5100	898	.18	957	.19
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.03*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.67		.73

196 . Hearthstone Bl. at ICD

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	26	.02*	33	.02*
NBT	2	3400	42	.01	54	.02
NBR	d	1700	412	.24	318	.19
SBL	1	1700	42	.02	28	.02
SBT	1	1700	44	.03*	37	.02*
SBR	d	1700	24	.01	26	.02
EBL	1	1700	33	.02	79	.05
EBT	3	5100	1535	.32*	1634	.34*
EBR	0	0	109		81	
WBL	1	1700	267	.16*	402	.24*
WBT	3	5100	1710	.34	1881	.38
WBR	0	0	15		37	
Right Turn Adjustment			NBR	.09*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.67		.67

198 . Paseo Westpark at Warner Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	104	.06*	136	.08
NBT	1	1700	87	.05	276	.16*
NBR	d	1700	40	.02	48	.03
SBL	1	1700	65	.04	58	.03*
SBT	1	1700	337	.20*	112	.07
SBR	d	1700	70	.04	58	.03
EBL	1	1700	153	.09*	120	.07*
EBT	2	3400	475	.14	565	.17
EBR	d	1700	96	.06	152	.09
WBL	1	1700	97	.06	67	.04
WBT	2	3400	636	.19*	580	.17*
WBR	d	1700	150	.09	95	.06
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.59		.48

199 . Paseo Westpark at Barranca Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	84	.02*	172	.05
NBT	1	1700	113	.07	345	.20*
NBR	1	1700	174	.10	224	.13
SBL	2	3400	124	.04	91	.03*
SBT	1	1700	268	.16*	159	.09
SBR	d	1700	78	.05	70	.04
EBL	1	1700	31	.02*	109	.06
EBT	3	5100	662	.13	1216	.24*
EBR	1	1700	91	.05	165	.10
WBL	1	1700	240	.14	146	.09*
WBT	3	5100	1428	.29*	998	.23
WBR	0	0	66		156	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.54		.61

200 . Paseo Westpark at Alton Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	91	.05	101	.06
NBT	1	1700	143	.15*	331	.27*
NBR	0	0	116		128	
SBL	1	1700	196	.12*	96	.06*
SBT	1	1700	163	.10	122	.07
SBR	1	1700	230	.14	131	.08
EBL	1	1700	26	.02*	80	.05
EBT	3	5100	523	.13	876	.18*
EBR	0	0	122		56	
WBL	1	1700	158	.09	132	.08*
WBT	3	5100	1248	.24*	688	.13
WBR	d	1700	143	.08	159	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.58		.64

201 . Paseo Westpark at Main St.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	201	.12	42	.02
NBT	1	1700	197	.19*	346	.23*
NBR	0	0	123		40	
SBL	1	1700	168	.10*	45	.03*
SBT	1	1700	248	.15	125	.07
SBR	1	1700	185	.11	94	.06
EBL	1	1700	18	.01*	102	.06
EBT	2	3400	341	.10	755	.22*
EBR	d	1700	139	.08	123	.07
WBL	1	1700	74	.04	22	.01*
WBT	2	3400	981	.29*	274	.08
WBR	d	1700	126	.07	82	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.64		.54

221 . Culver Dr. at Bryan Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	379	.11*	694	.20*
NBT	3	5100	648	.13	1592	.31
NBR	1	1700	233	.14	535	.31
SBL	2	3400	144	.04	154	.05
SBT	3	5100	2218	.43*	894	.18*
SBR	d	1700	358	.21	150	.09
EBL	2	3400	142	.04*	255	.08*
EBT	1.5	5100	273	{.13}	471	{.14}
EBR	1.5		525		454	{.12}
WBL	2	3400	557	.16	272	.08
WBT	2	3400	693	.26*	655	.24*
WBR	0	0	180		173	
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .89 .75

222 . Culver Dr. at Trabuco Rd.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	559	.11*	1875	.37*
NBR	f		1049		1477	
SBL	1	1700	711	.42*	345	.20*
SBT	3	5100	2479	.49	1255	.25
SBR	f		712		179	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	647	.19*	526	.15*
WBT	0	0	0		0	
WBR	2	3400	784	.23	883	.26
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .77 .77

223 . Culver Dr. at I-5 SB Ramps

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1224	.24	2059	.40*
NBR	f		241		310	
SBL	0	0	0		0	
SBT	3	5100	2238	.44*	1485	.29
SBR	f		322		250	
EBL	3	5100	506	.10*	1001	.20*
EBT	0	0	0		0	
EBR	2	3400	419	.12	935	.28
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .65

224 . Culver Dr. at Walnut Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	169	.05*	368	.11
NBT	3	5100	775	.15	1679	.33*
NBR	1	1700	298	.18	376	.22
SBL	2	3400	275	.08	393	.12*
SBT	3	5100	1982	.39*	1463	.29
SBR	1	1700	467	.27	288	.17
EBL	2	3400	377	.11*	590	.17*
EBT	2	3400	658	.19	541	.16
EBR	1	1700	257	.15	140	.08
WBL	2	3400	461	.14	407	.12
WBT	2	3400	744	.22*	734	.22*
WBR	1	1700	288	.17	261	.15
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .82 .89

225 . Culver Dr. at Deerfield Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	44	.01*	119	.04
NBT	3	5100	980	.19	1874	.37*
NBR	1	1700	104	.06	136	.08
SBL	2	3400	156	.05	147	.04*
SBT	3	5100	2234	.44*	1557	.31
SBR	1	1700	259	.15	317	.19
EBL	1	1700	193	.11*	452	.27*
EBT	1	1700	180	.11	167	.10
EBR	d	1700	128	.08	171	.10
WBL	1	1700	179	.11	83	.05
WBT	1	1700	177	.21*	94	.13*
WBR	0	0	176		123	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .82 .86

226 . Culver Dr. at ICD

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	328	.10*	382	.11*
NBT	4	6800	696	.10	1536	.23
NBR	f		217		381	
SBL	2	3400	225	.07	276	.08
SBT	4	6800	1908	.28*	1362	.20*
SBR	1	1700	336	.20	221	.13
EBL	2	3400	252	.07	334	.10*
EBT	3	5100	1218	.24*	1192	.23
EBR	f		290		212	
WBL	2	3400	411	.12*	265	.08
WBT	3	5100	1316	.26	1326	.26*
WBR	f		112		201	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .79 .72

227 . Culver Dr. at Warner Av.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	155	.09*	300	.18*
NBT	3	5100	1072	.21	1981	.39
NBR	1	1700	72	.04	225	.13
SBL	1	1700	79	.05	103	.06
SBT	3	5100	2384	.47*	1447	.28*
SBR	d	1700	199	.12	275	.16
EBL	2	3400	264	.08	223	.07
EBT	2	3400	249	.07*	263	.08*
EBR	d	1700	275	.16	215	.13
WBL	1	1700	236	.14*	138	.08*
WBT	2	3400	397	.12	226	.07
WBR	d	1700	146	.09	147	.09
Right Turn Adjustment		EBR	.02*			
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .84 .67

228 . Culver Dr. at Barranca Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	145	.04*	280	.08
NBT	3	5100	749	.15	1824	.36*
NBR	1	1700	365	.21	389	.23
SBL	2	3400	360	.11	296	.09*
SBT	3	5100	2207	.43*	1256	.25
SBR	f		315		222	
EBL	2	3400	464	.14	359	.11*
EBT	2	3400	898	.26*	725	.21
EBR	1	1700	217	.13	488	.29
WBL	2	3400	401	.12*	277	.08
WBT	3	5100	851	.20	729	.21*
WBR	0	0	149		346	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .90 .82

229 . Culver Dr. at Alton Pkwy.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	132	.04*	273	.08
NBT	3	5100	1005	.20	2162	.42*
NBR	1	1700	269	.16	367	.22
SBL	2	3400	165	.05	218	.06*
SBT	3	5100	2203	.43*	1246	.24
SBR	f		322		235	
EBL	2	3400	130	.04*	310	.09
EBT	2	3400	535	.16	875	.26*
EBR	1	1700	168	.10	295	.17
WBL	2	3400	430	.13	339	.10*
WBT	2	3400	986	.29*	693	.20
WBR	1	1700	206	.12	248	.15
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .85 .89

230 . Culver Dr. at Main St.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	141	.04*	125	.04
NBT	3	5100	1123	.22	2199	.43*
NBR	1	1700	147	.09	483	.28
SBL	2	3400	63	.02	199	.06*
SBT	3	5100	2222	.44*	1638	.32
SBR	f		529		156	
EBL	2	3400	180	.05	592	.17*
EBT	2	3400	120	.04*	423	.12
EBR	f		105		167	
WBL	2	3400	523	.15*	162	.05
WBT	2	3400	330	.10	80	.02*
WBR	1	1700	118	.07	78	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .73

231 . Culver Dr. at Paseo Westpark

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	193	.11*	238	.14*
NBT	3	5100	1317	.26	2673	.52
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2742	.54*	1917	.38*
SBR	d	1700	147	.09	72	.04
EBL	1	1700	76	.04*	57	.03*
EBT	0	0	0		0	
EBR	1	1700	315	.19	73	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment		EBR	.07*			
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .81 .60

232 . Culver Dr. at I-405 NB Ramps

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	851	.17	2154	.42*
NBR	f		560		400	
SBL	0	0	0		0	
SBT	3	5100	1324	.26*	1293	.25
SBR	f		930		690	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	876	.26*	477	.14*
WBT	0	0	0		0	
WBR	1	1700	519	.31	796	.47
Right Turn Adjustment					WBR	.33*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .94

233 . Culver Dr. at I-405 SB Ramps

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1070	.21	1640	.32*
NBR	f		261		731	
SBL	0	0	0		0	
SBT	3	5100	1898	.37*	1326	.26
SBR	f		251		341	
EBL	1.5		303	{.16}*	965	.28*
EBT	0	5100	0	.16	0	
EBR	1.5		527		477	.28
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .65

234 . Culver Dr. at Michelson Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	134	.04*	390	.11
NBT	3	5100	948	.19	1879	.38*
NBR	0	0	9		79	
SBL	2	3400	183	.05	557	.16*
SBT	3	5100	1845	.36*	889	.17
SBR	1	1700	380	.22	353	.21
EBL	2	3400	338	.10	343	.10
EBT	1	1700	151	.09*	183	.11*
EBR	1	1700	261	.15	226	.13
WBL	1	1700	79	.05*	175	.10*
WBT	2	3400	110	.03	167	.05
WBR	1	1700	201	.12	298	.18
Right Turn Adjustment			EBR	.03*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .80

235 . Culver Dr. at University Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	70	.04
NBT	4	6800	1458	.21*	1729	.25*
NBR	2	3400	390	.11	949	.28
SBL	2	3400	31	.01*	31	.01*
SBT	4	6800	1368	.20	1171	.17
SBR	d	1700	397	.23	339	.20
EBL	2	3400	53	.02	421	.12
EBT	3	5100	640	.13*	1133	.22*
EBR	d	1700	18	.01	25	.01
WBL	2	3400	685	.20*	806	.24*
WBT	3	5100	1473	.29	762	.16
WBR	0	0	30		63	
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for NBR						

TOTAL CAPACITY UTILIZATION .60 .77

337 . Von Karman Ave. at Quartz

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	407	.24*	201	.12*
NBT	2	3400	1180	.35	1363	.40
NBR	1	1700	187	.11	58	.03
SBL	1	1700	187	.11	77	.05
SBT	2	3400	998	.29*	1362	.40*
SBR	d	1700	257	.15	99	.06
EBL	2	3400	57	.02*	194	.06*
EBT	1	1700	6	.00	5	.00
EBR	1	1700	70	.04	441	.26
WBL	1	1700	32	.02	57	.03
WBT	1	1700	16	.01*	10	.01*
WBR	f		64		163	
Right Turn Adjustment					EBR	.13*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .77

439 . Bixby at Michleson Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	15	.01*	31	.02*
NBT	1	1700	2	.00	4	.02
NBR	0	0	3		25	
SBL	2	3400	9	.00	124	.04
SBT	1	1700	3	.03*	4	.14*
SBR	0	0	48		234	
EBL	1	1700	298	.18*	146	.09*
EBT	2	3400	488	.16	711	.22
EBR	0	0	50		31	
WBL	1	1700	27	.02	66	.04
WBT	2	3400	547	.16*	905	.27*
WBR	1	1700	79	.05	50	.03
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.43		.57

440 . Siglo at Main St.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	148	.04*	321	.09*
SBT	0	0	0		0	
SBR	1	1700	161	.09	89	.05
EBL	2	3400	57	.02*	199	.06
EBT	3	5100	554	.11	2299	.45*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5100	1816	.36*	1081	.21
WBR	1	1700	254	.15	111	.07
Right Turn Adjustment			SBR	.03*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.50		.59

441 . Loop Rd. at Jamboree Rd. SB Ramps

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	20	.01	131	.04*
NBR	1	1700	20	.01	68	.04
SBL	1	1700	20	.01	22	.01*
SBT	2	3400	220	.06*	138	.04
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		560	.16*	282	.08*
WBT	0	5100	0		0	
WBR	1.5		50		89	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.27		.18

472 . Obsidian at Michleson Dr.

P2030 Existing General Plan (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	4		11	
NBT	1	1700	0	.01*	0	.02*
NBR	0	0	16		19	
SBL	0	0	11	{.01}*	135	{.08}*
SBT	1	1700	0	.01	0	.08
SBR	f		20		95	
EBL	1	1700	111	.07*	47	.03*
EBT	2	3400	464	.14	806	.24
EBR	0	0	15		8	
WBL	1	1700	15	.01	12	.01
WBT	2	3400	1386	.41*	874	.26*
WBR	f		139		63	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.55		.44

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline+ExistGP\EXE-193\ICU\P30GP-C-NPB01-102809

61 . Airport Wy. at Campus Dr.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	2	3200	429	.13	624	.20
EBL	1	1600	178	.11	245	.15*
EBT	3	4800	1790	.37*	1010	.21
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	461	.13	1516	.38*
WBR	0	0	162		325	
Right Turn Adjustment			SBR	.13*	SBR	.20*
TOTAL CAPACITY UTILIZATION				.50		.73

62 . Campus Dr. at Bristol St. NB

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	621	.19	751	.23*
NBT	3	4800	2417	.50*	679	.14
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6400	249	.04	1044	.16*
SBR	2	3200	374	.12	1226	.38
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	201	.13	346	.22
WBT	5	8000	1465	.23*	2613	.34*
WBR	0	0	463	.29	141	
Right Turn Adjustment			WBR	.06*	SBR	.22*
TOTAL CAPACITY UTILIZATION				.79		.95

63 . Campus Dr. at Bristol St. SB

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	5	8000	1503	.22*	826	.13*
NBR	0	0	240		235	.15
SBL	1	1600	182	.11*	315	.20*
SBT	3	4800	283	.06	1113	.23
SBR	0	0	0		0	
EBL	1.5		1527	{.56}*	516	{.24}*
EBT	2.5	6400	2028	.56	1044	.24
EBR	2	3200	467	.15	451	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.02*
TOTAL CAPACITY UTILIZATION				.89		.59

64 . Birch St. at Bristol St. NB

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	239	.07	297	.09*
NBT	2	3200	1308	.41*	673	.21
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	1.5	6400	334	.10	845	.33*
SBR	2.5		246	.08	1235	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		646		795	
WBT	3.5	8000	1684	.34*	1709	.34*
WBR	0		392		207	
TOTAL CAPACITY UTILIZATION				.75		.76

65 . Birch St. at Bristol St. SB

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2.5	6400	553	.15*	625	.16
NBR	1.5		417		384	
SBL	2	3200	287	.09*	357	.11
SBT	2	3200	623	.19	1285	.40*
SBR	0	0	0		0	
EBL	1.5		787		305	
EBT	3	8000	1066	.28*	1110	.20*
EBR	0.5		347		195	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .52 .60

84 . MacArthur Bl. at Campus Dr.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	61	.02	110	.03
NBT	4	6400	1049	.16*	1064	.17*
NBR	1	1600	131	.08	75	.05
SBL	1	1600	368	.23*	213	.13*
SBT	3.5	8000	1111	.17	1312	.26
SBR	1.5		260	.16	745	
EBL	2	3200	505	.16	387	.12*
EBT	3	4800	1200	.25*	641	.13
EBR	d	1600	125	.08	121	.08
WBL	2	3200	94	.03*	167	.05
WBT	3	4800	419	.09	1324	.28*
WBR	f		167		209	

TOTAL CAPACITY UTILIZATION .67 .70

85 . MacArthur Bl. at Birch St.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	57	.04	132	.08*
NBT	3	4800	1749	.36*	1194	.25
NBR	f		112		48	
SBL	1	1600	166	.10*	168	.11
SBT	4	6400	840	.17	2285	.39*
SBR	0	0	226		220	
EBL	1.5		180	.11*	303	{.16}*
EBT	1.5	4800	582	.21	465	.17
EBR	0		88		24	
WBL	1	1600	51	.03	135	.08
WBT	2	3200	468	.15*	1069	.33*
WBR	f		112		185	

TOTAL CAPACITY UTILIZATION .72 .96

105 . Von Karman Av. at Campus Dr.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	18	.01	83	.05*
NBT	2	3200	797	.25*	589	.18
NBR	f		104		158	
SBL	1	1600	105	.07*	245	.15
SBT	2	3200	507	.20	1029	.43*
SBR	0	0	125		336	
EBL	2	3200	289	.09	262	.08*
EBT	2	3200	722	.24*	639	.22
EBR	0	0	38		59	
WBL	1	1600	95	.06*	124	.08
WBT	2	3200	457	.18	984	.34*
WBR	0	0	124		100	

TOTAL CAPACITY UTILIZATION .62 .90

106 . Von Karman Av. at Birch St.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	42	.03	95	.06*
NBT	2	3200	642	.22*	515	.21
NBR	0	0	73		141	
SBL	1	1600	61	.04*	55	.03
SBT	2	3200	313	.17	681	.29*
SBR	0	0	217		234	
EBL	1	1600	126	.08*	182	.11*
EBT	2	3200	316	.12	474	.17
EBR	0	0	66		54	
WBL	1	1600	110	.07	45	.03
WBT	2	3200	461	.15*	592	.21*
WBR	0	0	32		83	

TOTAL CAPACITY UTILIZATION .49 .67

107 . Von Karman Av. at MacArthur Bl.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	40	.03*	141	.09
NBT	2	3200	140	.04	255	.08*
NBR	f		39		185	
SBL	2	3200	152	.05	753	.24*
SBT	1	1600	177	.11*	119	.07
SBR	f		30		66	
EBL	1	1600	71	.04*	66	.04
EBT	3	4800	452	.09	1018	.21*
EBR	f		157		65	
WBL	1	1600	79	.05	46	.03*
WBT	3	4800	906	.19*	625	.13
WBR	f		736		170	

TOTAL CAPACITY UTILIZATION .37 .56

121 . Teller Av. at Campus Dr.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	7	.00	36	.02*
NBT	1	1600	50	.03	96	.06
NBR	1	1600	32	.02	58	.04
SBL	1	1600	48	.03	151	.09
SBT	1	1600	123	.15*	128	.19*
SBR	0	0	110		171	
EBL	1	1600	115	.07*	75	.05
EBT	2	3200	663	.21	1001	.31*
EBR	f		37		28	
WBL	1	1600	51	.03	64	.04*
WBT	2	3200	667	.27*	642	.23
WBR	0	0	207		109	

TOTAL CAPACITY UTILIZATION .49 .56

147 . Jamboree Rd. at Campus Dr.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	248	.08	111	.03
NBT	4	6400	1508	.24*	1949	.30*
NBR	1	1600	184	.12	595	.37
SBL	2	3200	569	.18*	402	.13*
SBT	4	6400	1692	.29	2018	.34
SBR	0	0	137		146	
EBL	2	3200	121	.04	376	.12
EBT	2	3200	587	.18*	698	.22*
EBR	f		43		346	
WBL	2	3200	745	.23*	383	.12*
WBT	2	3200	606	.19	645	.20
WBR	1	1600	211	.13	452	.28

Note: Assumes Right-Turn Overlap for WBR NBR

TOTAL CAPACITY UTILIZATION .83 .77

148 . Jamboree Rd. at Birch St.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	167	.10*	190	.12*
NBT	3	4800	1818	.38	1982	.41
NBR	0	0	1		1	
SBL	1	1600	5	.00	1	.00
SBT	4	6400	2031	.32*	2388	.37*
SBR	f		464		300	
EBL	1.5		156	{.05}*	518	{.16}*
EBT	0.5	3200	2	.05	0	.16
EBR	f		33		192	
WBL	0	0	0		0	
WBT	1	1600	0	.00*	0	.00*
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .47 .65

149 . Jamboree Rd. at Fairchild Rd.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	14	.01	35	.02
NBT	3	4800	2103	.45*	1914	.41*
NBR	0	0	50		46	
SBL	2	3200	330	.10*	361	.11*
SBT	4	6400	1814	.28	2271	.35
SBR	d	1600	12	.01	4	.00
EBL	1	1600	5	.00	140	.09
EBT	1	1600	0	.00*	93	.28*
EBR	0	0	5		356	
WBL	1	1600	11	.01*	32	.02*
WBT	1	1600	4	.00	21	.01
WBR	1	1600	462	.29	296	.19
Right Turn Adjustment			WBR	.28*		

TOTAL CAPACITY UTILIZATION .84 .82

150 . Jamboree Rd. at MacArthur Bl.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	479	.15*	222	.07*
NBT	4	6400	1276	.20	1161	.18
NBR	1	1600	261	.16	41	.03
SBL	3	4800	540	.11	685	.14
SBT	3	4800	930	.19*	1669	.35*
SBR	1	1600	250	.16	161	.10
EBL	2	3200	174	.05*	277	.09
EBT	3	4800	559	.12	1277	.27*
EBR	f		143		344	
WBL	2	3200	148	.05	320	.10*
WBT	3	4800	1611	.34*	708	.15
WBR	1	1600	730	.46	515	.32
Right Turn Adjustment			WBR	.12*	WBR	.04*

TOTAL CAPACITY UTILIZATION .85 .83

151 . Jamboree Rd. at Bristol St. NB-SR73 NB Ramps

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	786	.25*	571	.18*
NBT	3	4800	1830	.38	2239	.47
NBR	f		0		0	
SBL	0	0	0		0	
SBT	2.5	6400	560	.16*	1303	.37*
SBR	1.5		444		1088	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .41 .55

153 . Jamboree Rd. at Bristol St. SB

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	6	9600	1496	.16*	1612	.18
NBR	0	0	36		74	
SBL	0	0	0		0	
SBT	4	6400	618	.10	1216	.19*
SBR	0	0	0		0	
EBL	2.5		1586	.33*	1298	{.36}*
EBT	1.5	6400	488	.31	996	.36
EBR	2	3200	776	.24	844	.26
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .49 .55

154 . Jamboree Rd. at Eastbluff Dr.-University Dr.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	38	.02	28	.02*
NBT	3	4800	1324	.28*	1354	.28
NBR	1	1600	225	.14	248	.16
SBL	2	3200	153	.05*	243	.08
SBT	3	4800	1136	.24	1714	.36*
SBR	1	1600	359	.22	501	.31
EBL	1.5		449	{.20}*	278	{.13}*
EBT	0.5	3200	161	.20	127	.13
EBR	0		17		18	
WBL	1.5		296		280	
WBT	1.5	4800	206	.10*	218	.10*
WBR	f		365		209	

TOTAL CAPACITY UTILIZATION .63 .61

155 . Jamboree Rd. at Bison Av.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	1229	.26*	1528	.32
NBR	d	1600	282	.18	151	.09
SBL	2	3200	198	.06*	169	.05
SBT	3	4800	1336	.28	1788	.37*
SBR	1	1600	210	.13	120	.08
EBL	1	1600	110	.07*	63	.04
EBT	0	0	0		0	
EBR	1	1600	85	.05	38	.02
WBL	2	3200	168	.05	424	.13*
WBT	0	0	0		0	
WBR	2	3200	161	.05	258	.08
Right Turn Adjustment			Multi	.08*	EBR	.02*

TOTAL CAPACITY UTILIZATION .47 .52

156 . Jamboree Rd. at Ford Rd.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	337	.11*	319	.10*
NBT	3	4800	1263	.28	1738	.39
NBR	0	0	79		152	
SBL	1	1600	76	.05	58	.04
SBT	3	4800	1446	.30*	2113	.44*
SBR	1	1600	239	.15	78	.05
EBL	1.5		293	{.11}*	104	.07
EBT	1.5	4800	252	.11	251	.08*
EBR	1	1600	215	.13	228	.14
WBL	1.5		93	.06	139	{.07}*
WBT	1.5	4800	389	.12*	193	.07
WBR	1	1600	38	.02	47	.03
Right Turn Adjustment					EBR	.06*

TOTAL CAPACITY UTILIZATION .64 .75

176 . Fairchild Av. at MacArthur Bl.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	51	.03*	598	.37*
SBT	0	0	0		0	
SBR	1	1600	20	.01	204	.13
EBL	1	1600	304	.19*	42	.03
EBT	3	4800	1131	.24	2082	.43*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	2505	.67*	1436	.33
WBR	0	0	729		148	

TOTAL CAPACITY UTILIZATION .89 .80

178 . MacArthur Bl. at Bison Av.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	256	.08	251	.08*
NBT	4	6400	2465	.39*	2451	.38
NBR	1	1600	185	.12	185	.12
SBL	2	3200	86	.03*	225	.07
SBT	4	6400	2024	.32	2781	.43*
SBR	1	1600	323	.20	416	.26
EBL	2	3200	255	.08	218	.07
EBT	2	3200	299	.09*	220	.07*
EBR	f		196		252	
WBL	2	3200	390	.12*	457	.14*
WBT	2	3200	271	.08	423	.13
WBR	1	1600	90	.06	171	.11

TOTAL CAPACITY UTILIZATION .63 .72

179 . MacArthur Bl. at Ford Rd.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	102	.03	57	.02
NBT	4	6400	1927	.30*	2382	.37*
NBR	f		83		445	
SBL	3	4800	557	.12*	814	.17*
SBT	4	6400	1929	.30	2380	.37
SBR	f		13		51	
EBL	2	3200	40	.01	29	.01
EBT	2	3200	271	.08*	301	.09*
EBR	1	1600	118	.07	59	.04
WBL	2	3200	557	.17*	229	.07*
WBT	2	3200	325	.10	283	.09
WBR	f		957		519	

TOTAL CAPACITY UTILIZATION .67 .70

194 . MacArthur Blvd. SB at University Dr.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	68	.04*	129	.08*
NBT	0	0	0		0	
NBR	1	1600	599	.37	542	.34
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	1571	.34*	1254	.27*
EBR	0	0	69		21	
WBL	2	3200	101	.03*	340	.11*
WBT	3	4800	1012	.21	894	.19
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.33*	NBR	.26*

TOTAL CAPACITY UTILIZATION .74 .72

195 . SR-73 SB Ramps at University Dr.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	1028	.64*	711	.44*
SBT	0	0	0		0	
SBR	1	1600	70	.04	219	.14
EBL	0	0	0		0	
EBT	3	4800	602	.13	639	.13
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	690	.14*	751	.16*
WBR	0	0	0		0	
TOTAL CAPACITY UTILIZATION				.78		.60

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline+ExistGP\EXE-193\ICU\P30GP-C-NPB02-102809

733 . Irvine Av. at Mesa Dr.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	116	.07	45	.03*
NBT	3	4800	1152	.24*	642	.13
NBR	d	1600	388	.24	290	.18
SBL	1	1600	28	.02*	28	.02
SBT	3	4800	435	.09	1532	.32*
SBR	d	1600	84	.05	222	.14
EBL	1	1600	152	.10	48	.03*
EBT	1	1600	296	.19*	212	.13
EBR	1	1600	45	.03	145	.09
WBL	2	3200	262	.08*	573	.18
WBT	1	1600	110	.07	562	.35*
WBR	1	1600	30	.02	41	.03
TOTAL CAPACITY UTILIZATION			.53		.73	

734 . Irvine Av. at University Dr.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	164	.10	184	.12*
NBT	3	4800	1335	.28*	643	.13
NBR	1	1600	1	.00	11	.01
SBL	1	1600	106	.07*	52	.03
SBT	3	4800	529	.11	1641	.34*
SBR	1	1600	147	.09	507	.32
EBL	1.5		394	{.14}*	269	{.10}*
EBT	0.5	3200	64	.14	59	.10
EBR	1	1600	139	.09	195	.12
WBL	1	1600	12	.01	29	.02
WBT	1	1600	28	.02*	79	.05*
WBR	d	1600	32	.02	52	.03
TOTAL CAPACITY UTILIZATION			.51		.61	

741 . Jamboree Av. at San Joaquin Hills Rd.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	45	.03	78	.05
NBT	3	4800	1135	.24*	1602	.33*
NBR	f		129		142	
SBL	2	3200	669	.21*	463	.14*
SBT	3	4800	1220	.25	1853	.39
SBR	f		41		136	
EBL	1.5		265	.08*	161	.05*
EBT	1.5	4800	34	.02	35	.02
EBR	f		60		57	
WBL	2	3200	132	.04	191	.06
WBT	1	1600	14	.01*	46	.03*
WBR	1	1600	43	.03	67	.04
Right Turn Adjustment			WBR	.02*	WBR	.01*
TOTAL CAPACITY UTILIZATION			.56		.56	

742 . MacArthur Blvd. at San Joaquin Hills Rd.

P2030 Existing General Plan (NEWPORT BEACH ISEC

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	140	.04*	111	.03
NBT	4	6400	1304	.24	1881	.30*
NBR	0	0	204		31	
SBL	3	4800	269	.06	559	.12*
SBT	3	4800	1775	.37*	1874	.39
SBR	f		480		230	
EBL	3	4800	446	.09*	512	.11*
EBT	3	4800	113	.03	390	.12
EBR	0	0	40		162	
WBL	1	1600	11	.01	54	.03
WBT	2	3200	388	.12*	330	.10*
WBR	f		470		568	
TOTAL CAPACITY UTILIZATION			.62		.63	

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline+ExistGP\EXE-193\ICU\P30GP-C-SAN01-102809

4 . SR-55 SB Ramps at Edinger Av.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		433		340	{.11}*
NBT	0.5	3400	44	.14*	39	.11
NBR	2	3400	534	.16	191	.06
SBL	1	1700	85	.05*	143	.08
SBT	1	1700	23	.03	77	.08*
SBR	0	0	32		60	
EBL	1	1700	45	.03	56	.03
EBT	3	5100	1975	.39*	1815	.36*
EBR	f		278		329	
WBL	2	3400	450	.13*	477	.14*
WBT	3	5100	1789	.37	1637	.34
WBR	0	0	101		95	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .74

5 . Hotel Terrace Dr. at Dyer Rd.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		187	{.06}*	184	{.06}*
NBT	0.5	3400	11	.06	11	.06
NBR	2	3400	403	.12	86	.03
SBL	0.5		117		102	
SBT	1.5	3400	172	.09*	498	.18*
SBR	1	1700	42	.02	161	.09
EBL	1	1700	60	.04	131	.08
EBT	3	5100	1369	.27*	1042	.20*
EBR	1	1700	346	.20	169	.10
WBL	2	3400	521	.15*	662	.19*
WBT	3	5100	971	.19	1114	.22
WBR	1	1700	188	.11	49	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .68

6 . Grand Av. at Dyer Rd.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	728	.21*	733	.22*
SBT	0	0	0		0	
SBR	1	1700	444	.26	288	.17
EBL	2	3400	174	.05	330	.10*
EBT	3	5100	1722	.34*	1001	.20
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5100	1246	.24	1587	.31*
WBR	f		736		492	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .68

7 . SR-55 NB Ramps at Dyer Rd.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		913	{.33}*	287	.08*
NBT	0	5100	0	.33	0	
NBR	1.5		795		104	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	2695	.53*	1226	.24
EBR	f		550		1020	
WBL	0	0	0		0	
WBT	2.5	5100	1117	.28	1903	.56*
WBR	0.5		330		1470	.86
Right Turn Adjustment					WBR	.24*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .91 .93

8 . SR-55 SB Ramps at MacArthur Blvd.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	1148	.34*	348	.10*
SBT	0	0	0		0	
SBR	2	3400	1030	.30	749	.22
EBL	0	0	0		0	
EBT	2	3400	1442	.42*	1172	.34
EBR	f		760		1070	
WBL	0	0	0		0	
WBT	3	5100	1260	.25	1791	.35*
WBR	f		190		890	
Right Turn Adjustment					SBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.81		.62

9 . SR-55 NB Ramps at MacArthur Blvd.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	1074	.32*	754	.22*
NBT	0	0	0		0	
NBR	f		772		234	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	1748	.51*	806	.24
EBR	f		640		810	
WBL	0	0	0		0	
WBT	3	5100	616	.12	1866	.37*
WBR	f		300		1290	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.88		.64

28 . Pullman St. at Warner Av.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		68		187	
NBT	0.5	1700	17	.05*	11	.12*
NBR	1	1700	75	.04	112	.07
SBL	0	0	47	{.03}*	121	{.07}*
SBT	2	3400	18	.02	34	.06
SBR	0	0	15		154	.09
EBL	1	1700	89	.05	48	.03*
EBT	3	5100	2118	.45*	1479	.30
EBR	0	0	186		59	
WBL	1	1700	46	.03*	58	.03
WBT	3	5100	1197	.25	2084	.41*
WBR	0	0	63		31	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.61		.68

29 . Pullman St. at Barranca Pkwy.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	124	.04*	710	.21*
NBT	1	1700	16	.03	14	.05
NBR	0	0	30		76	
SBL	1	1700	40	.02	27	.02
SBT	0.5	3400	18	{.01}*	7	{.07}*
SBR	1.5		102		386	
EBL	1	1700	365	.21	189	.11*
EBT	3	5100	1833	.46*	1074	.23
EBR	0	0	503		81	
WBL	1	1700	43	.03*	53	.03
WBT	3	5100	1033	.21	2174	.43*
WBR	0	0	21		28	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.59		.87

543 . Bristol St. at Segerstrom Av.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	94	.06*	231	.14
NBT	3	5100	821	.16	1423	.28*
NBR	d	1700	234	.14	384	.23
SBL	1	1700	268	.16	180	.11*
SBT	3	5100	1342	.29*	980	.21
SBR	0	0	119		110	
EBL	1	1700	257	.15	270	.16*
EBT	2	3400	1220	.39*	986	.38
EBR	0	0	100		304	
WBL	1	1700	209	.12*	276	.16
WBT	2	3400	768	.25	1188	.39*
WBR	0	0	93		127	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.91		.99

544 . Bristol St. at MacArthur Blvd.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	104	.03*	469	.14*
NBT	3	5100	822	.16	1693	.33
NBR	1	1700	125	.07	338	.20
SBL	2	3400	281	.08	285	.08
SBT	3	5100	1537	.33*	1191	.27*
SBR	0	0	159		184	
EBL	2	3400	225	.07	371	.11*
EBT	3	5100	1165	.23*	716	.14
EBR	1	1700	150	.09	163	.10
WBL	2	3400	168	.05*	378	.11
WBT	3	5100	963	.19	1390	.27*
WBR	1	1700	159	.09	282	.17
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.69		.84

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline+ExistGP\EXE-193\ICU\P30GP-C-SAN02-102809

719 . Flower St. at Segerstrom Av.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	98	.06	133	.08*
NBT	2	3400	607	.21*	502	.20
NBR	0	0	117		176	
SBL	1	1700	165	.10*	180	.11
SBT	2	3400	507	.18	777	.26*
SBR	0	0	90		94	
EBL	1	1700	134	.08	134	.08*
EBT	2	3400	1358	.49*	844	.29
EBR	0	0	316		153	
WBL	1	1700	108	.06*	59	.03
WBT	2	3400	841	.27	1312	.42*
WBR	0	0	79		104	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .91 .89

720 . Flower St. at MacArthur Blvd.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	81	.05	30	.02
NBT	2	3400	474	.23*	597	.19*
NBR	0	0	317		55	
SBL	1	1700	239	.14*	95	.06*
SBT	2	3400	337	.19	339	.13
SBR	0	0	292		117	
EBL	1	1700	141	.08	231	.14*
EBT	3	5100	1325	.27*	980	.21
EBR	0	0	28		82	
WBL	1	1700	42	.02*	109	.06
WBT	3	5100	696	.15	1893	.42*
WBR	0	0	59		232	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .71 .86

723 . Main St. at Dyer Rd.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	84	.05*	220	.13
NBT	2	3400	458	.13	1258	.37*
NBR	1	1700	208	.12	409	.24
SBL	1	1700	221	.13	90	.05*
SBT	3	5100	1212	.27*	637	.16
SBR	0	0	190		183	
EBL	1	1700	248	.15	199	.12*
EBT	2	3400	1341	.39*	703	.21
EBR	1	1700	283	.17	106	.06
WBL	1	1700	185	.11*	208	.12
WBT	2	3400	885	.26	1139	.34*
WBR	1	1700	104	.06	165	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .87 .93

724 . Main St. at Alton Pkwy.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	12	.01*	28	.02
NBT	3	5100	778	.16	1848	.38*
NBR	0	0	48		82	
SBL	1	1700	92	.05	90	.05*
SBT	3	5100	1582	.31*	849	.17
SBR	0	0	7		29	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0.5		38		80	
WBT	0.5	1700	2	.02*	1	.05*
WBR	1	1700	32	.02	71	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .39 .53

725 . Main St. at MacArthur Blvd.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	49	.01	403	.12
NBT	3	5100	312	.06*	880	.17*
NBR	1	1700	214	.13	435	.26
SBL	2	3400	444	.13*	208	.06*
SBT	3	5100	841	.16	494	.10
SBR	1	1700	158	.09	288	.17
EBL	2	3400	288	.08	318	.09*
EBT	3	5100	1592	.31*	607	.12
EBR	1	1700	209	.12	66	.04
WBL	2	3400	339	.10*	260	.08
WBT	3	5100	693	.14	1259	.25*
WBR	1	1700	270	.16	442	.26
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.65		.62

727 . Halladay St. at Dyer Rd.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	53	.03
NBT	1	1700	15	.06*	104	.18*
NBR	0	0	84		200	
SBL	1	1700	254	.15*	188	.11*
SBT	1	1700	75	.13	64	.10
SBR	0	0	142		107	
EBL	1	1700	125	.07	186	.11*
EBT	3	5100	1502	.30*	1186	.23
EBR	0	0	21		11	
WBL	1	1700	184	.11*	85	.05
WBT	3	5100	848	.19	1363	.29*
WBR	0	0	120		102	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.67		.74

728 . Halladay St. E at Alton Pkwy.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0.5		33		54	
SBT	0	1700	0	.17*	0	.10*
SBR	0.5		253		115	
EBL	1	1700	86	.05*	313	.18*
EBT	1	1700	47	.03	27	.02
EBR	0	0	0		0	
WBL	1	1700	0	.00	0	.00
WBT	1	1700	17	.01*	48	.03*
WBR	1	1700	34	.02	63	.04
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.28		.36

729 . Halladay St. W at Alton Pkwy.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		1		21	
NBT	0.5	1700	0	.02*	0	.10*
NBR	0		29		150	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	1	1700	116	.10*	197	.12*
EBR	0	0	53		4	
WBL	0.5		182	{.11}*	26	{.02}*
WBT	0.5	1700	88	.16	142	.10
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.28		.29

730 . Grand Av. at Warner Av.

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	151	.09	261	.15
NBT	3	5100	565	.17*	662	.17*
NBR	0	0	324	.19	196	
SBL	1	1700	407	.24*	305	.18*
SBT	3	5100	562	.16	495	.15
SBR	0	0	271		310	.18
EBL	2	3400	494	.15	470	.14*
EBT	3	5100	1673	.33*	971	.19
EBR	1	1700	224	.13	161	.09
WBL	2	3400	185	.05*	255	.08
WBT	2	3400	730	.21	1512	.44*
WBR	1	1700	273	.16	531	.31
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .84 .98

731 . Grand Av. at SR-55 SB Ramps

P2030 Existing General Plan (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	905	.27*	820	.24*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	704	.14	710	.14
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	481	.28*	330	.19*
WBT	0	0	0		0	
WBR	1	1700	340	.20	240	.14
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .48

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline+ExistGP\EXE-193\ICU\P30GP-C-TUS01-102809

3 . Newport Av. at Edinger Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	418	.12*	642	.19*
NBT	3	5100	227	.04	811	.16
NBR	d	1700	117	.07	98	.06
SBL	2	3400	204	.06	49	.01
SBT	3	5100	944	.19*	401	.08*
SBR	1	1700	747	.44	320	.19
EBL	2	3400	332	.10	739	.22*
EBT	3	5100	1500	.29*	823	.16
EBR	1	1700	775	.46	765	.45
WBL	1	1700	171	.10*	204	.12
WBT	3	5100	1255	.25	1378	.27*
WBR	f		81		190	
Right Turn Adjustment		Multi		.20*		
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .95 .81

14 . Walnut Av. at McFadden St.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	386	.11*	623	.18*
NBT	0	0	0		0	
NBR	1	1700	19	.01	104	.06
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	374	.22*	526	.30*
EBR	0	0	674	.40	496	
WBL	1	1700	83	.05*	54	.03*
WBT	2	3400	723	.21	437	.13
WBR	0	0	0		0	
Right Turn Adjustment		EBR		.10*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .56

18 . Newport Av. at Bryan Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	75	.04*	135	.08
NBT	3	5100	715	.14	1639	.33*
NBR	0	0	20		35	
SBL	1	1700	72	.04	130	.08*
SBT	3	5100	2299	.46*	1293	.26
SBR	0	0	48		33	
EBL	1	1700	12	.01*	49	.03*
EBT	1	1700	22	.01	55	.03
EBR	1	1700	77	.05	179	.11
WBL	1	1700	35	.02	48	.03
WBT	1	1700	53	.03*	63	.04*
WBR	1	1700	213	.13	412	.24
Right Turn Adjustment					WBR	.14*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .59 .67

19 . Newport Av. at Main St.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	119	.07	211	.12
NBT	3	5100	566	.13*	1491	.32*
NBR	0	0	74		121	
SBL	1	1700	202	.12*	99	.06*
SBT	3	5100	596	.17	1121	.26
SBR	0	0	283		196	
EBL	1	1700	102	.06	227	.13*
EBT	2	3400	256	.08*	411	.12
EBR	1	1700	322	.19	231	.14
WBL	1	1700	326	.19*	239	.14
WBT	2	3400	300	.09	694	.20*
WBR	1	1700	14	.01	45	.03
Right Turn Adjustment		EBR		.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .76

20 . Newport Av. at El Camino Real

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	221	.13*	260	.15
NBT	3	5100	772	.18	1355	.30*
NBR	0	0	131		181	
SBL	1	1700	136	.08	191	.11*
SBT	3	5100	1965	.39*	1084	.23
SBR	0	0	30		92	
EBL	1	1700	17	.01	54	.03
EBT	1	1700	153	.09*	248	.15*
EBR	1	1700	421	.25	251	.15
WBL	1	1700	174	.10*	235	.14*
WBT	2	3400	229	.09	408	.16
WBR	0	0	91		142	
Right Turn Adjustment			EBR	.06*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .82 .75

21 . Newport Av. at I-5 NB Ramps

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	196	.12*	329	.19*
NBT	3	5100	1220	.24	2120	.42
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2070	.52*	1300	.35*
SBR	0	0	564		481	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .59

22 . Newport Av. at Nisson Rd.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1074	.23	1877	.39*
NBR	0	0	82		98	
SBL	1	1700	177	.10	246	.14*
SBT	3	5100	1859	.36*	1138	.22
SBR	0	0	0		0	
EBL	1.5		279		371	
EBT	0.5	3400	61	.10*	49	.12*
EBR	f		438		580	
WBL	1	1700	74	.04*	78	.05*
WBT	0	0	0		0	
WBR	1	1700	157	.09	172	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .75

23 . Newport Av. at McFadden St.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	42	.02*	70	.04*
NBT	3	5100	915	.18	1586	.31
NBR	0	0	11		16	
SBL	1	1700	18	.01	40	.02
SBT	3	5100	1852	.54*	1102	.30*
SBR	0	0	908		411	
EBL	2	3400	305	.09*	535	.16*
EBT	0	0	1		9	
EBR	1	1700	68	.04	37	.02
WBL	0	0	0		0	
WBT	1	1700	0	.00*	0	.00*
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .70 .55

24 . Newport Av. at Walnut Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	44	.03	156	.09
NBT	3	5100	723	.16*	1158	.26*
NBR	0	0	94		160	
SBL	1	1700	761	.45*	544	.32*
SBT	3	5100	1159	.24	699	.15
SBR	0	0	48		58	
EBL	1	1700	126	.07	42	.02*
EBT	2	3400	435	.18*	415	.15
EBR	0	0	179		93	
WBL	1	1700	152	.09*	168	.10
WBT	2	3400	327	.19	496	.29*
WBR	0	0	361	.21	650	.38
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .93 .94

25 . Newport Av. at Sycamore Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	212	.12*	398	.23*
NBT	3	5100	413	.08	1105	.22
NBR	d	1700	109	.06	166	.10
SBL	1	1700	211	.12	239	.14
SBT	3	5100	1395	.27*	669	.13*
SBR	d	1700	91	.05	121	.07
EBL	1	1700	113	.07	95	.06*
EBT	2	3400	20	.01*	18	.01
EBR	0	0	67	.04	38	.02
WBL	1	1700	319	.19*	184	.11
WBT	2	3400	137	.08	361	.20*
WBR	0	0	184	.11	326	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .64 .67

27 . Del Amo Av. at Edinger Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		100	{.03}*	231	{.07}*
NBT	0.5	3400	4	.03	0	.07
NBR	1	1700	264	.16	248	.15
SBL	0	0	0		0	
SBT	1	1700	0	.00*	0	.00*
SBR	0	0	0		0	
EBL	1	1700	13	.01	7	.00
EBT	3	5100	1556	.31*	872	.17
EBR	d	1700	202	.12	75	.04
WBL	2	3400	178	.05*	245	.07
WBT	3	5100	1420	.28	1589	.31*
WBR	d	1700	0	.00	0	.00
Right Turn Adjustment		NBR	.08*			
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .52 .43

35 . Red Hill Av. at Bryan Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	151	.09*	214	.13
NBT	3	5100	373	.10	793	.17*
NBR	0	0	135		68	
SBL	1	1700	111	.07	99	.06*
SBT	3	5100	846	.19*	424	.10
SBR	0	0	123		73	
EBL	1	1700	78	.05*	68	.04*
EBT	2	3400	624	.22	492	.19
EBR	0	0	117		154	
WBL	1	1700	87	.05	92	.05
WBT	2	3400	625	.22*	859	.30*
WBR	0	0	109		153	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .62

36 . Red Hill Av. at El Camino Real

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	317	.09*	442	.13
NBT	3	5100	604	.12	811	.16*
NBR	1	1700	161	.09	295	.17
SBL	1	1700	87	.05	250	.15*
SBT	3	5100	1266	.26*	590	.13
SBR	0	0	65		65	
EBL	1	1700	119	.07	34	.02
EBT	1.5	5100	310	{.10}*	965	.28*
EBR	1.5		321		160	
WBL	1.5		318	{.12}*	320	.19*
WBT	1.5	5100	249	.12	1033	.35
WBR	0		53		155	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .83

37 . Red Hill Av. at Nisson Rd.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	19	.01*	15	.01
NBT	4	6800	801	.12	1468	.22*
NBR	0	0	40		51	
SBL	1	1700	130	.08	178	.10*
SBT	3	5100	1429	.28*	722	.14
SBR	d	1700	111	.07	45	.03
EBL	1	1700	197	.12*	217	.13*
EBT	1	1700	70	.06	183	.12
EBR	0	0	33		29	
WBL	1	1700	42	.02	73	.04
WBT	1	1700	80	.19*	111	.19*
WBR	0	0	238		206	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .69

38 . Red Hill Av. at Walnut Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	136	.08*	344	.20
NBT	3	5100	381	.10	1642	.36*
NBR	0	0	154		193	
SBL	1	1700	102	.06	123	.07*
SBT	3	5100	1304	.28*	485	.13
SBR	0	0	133		201	
EBL	1	1700	158	.09	234	.14*
EBT	2	3400	529	.28*	424	.17
EBR	0	0	424		142	
WBL	2	3400	238	.07*	229	.07
WBT	2	3400	432	.17	644	.23*
WBR	0	0	131		128	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .85

39 . Red Hill Av. at Sycamore Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	106	.06*	559	.33*
NBT	3	5100	609	.13	1835	.38
NBR	0	0	33		96	
SBL	1	1700	53	.03	111	.07
SBT	3	5100	1724	.37*	621	.17*
SBR	0	0	188		257	
EBL	1	1700	80	.05*	102	.06*
EBT	1	1700	25	.01	43	.03
EBR	1	1700	147	.09	157	.09
WBL	1	1700	79	.05	42	.02
WBT	1	1700	155	.09*	45	.03*
WBR	1	1700	62	.04	53	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .64

40 . Red Hill Av. at Edinger Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	67	.02*	215	.06
NBT	3	5100	230	.05	1620	.32*
NBR	1	1700	195	.11	476	.28
SBL	2	3400	303	.09	172	.05*
SBT	3	5100	1311	.26*	378	.07
SBR	1	1700	294	.17	200	.12
EBL	2	3400	233	.07	292	.09*
EBT	3	5100	1175	.23*	758	.15
EBR	1	1700	248	.15	100	.06
WBL	2	3400	629	.19*	235	.07
WBT	3	5100	1191	.23	1123	.22*
WBR	1	1700	145	.09	532	.31
Right Turn Adjustment					WBR	.04*
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for WBR EBR						
TOTAL CAPACITY UTILIZATION				.75		.77

41 . Red Hill Av. at Warner Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	550	.16*	803	.24
NBT	3	5100	518	.10	2051	.40*
NBR	1	1700	124	.07	205	.12
SBL	2	3400	114	.03	141	.04*
SBT	3	5100	1588	.31*	673	.13
SBR	1	1700	687	.40	439	.26
EBL	2	3400	278	.08*	335	.10*
EBT	3	5100	1387	.27	1398	.27
EBR	1	1700	482	.28	336	.20
WBL	2	3400	78	.02	135	.04
WBT	3	5100	1273	.25*	1495	.29*
WBR	1	1700	130	.08	178	.10
Right Turn Adjustment				SBR .03*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.88		.88

55 . Browning Av. at Bryan Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	51	.03	89	.05
NBT	2	3400	339	.10*	645	.19*
NBR	d	1700	290	.17	81	.05
SBL	1	1700	110	.06*	61	.04*
SBT	2	3400	201	.06	125	.04
SBR	d	1700	49	.03	44	.03
EBL	1	1700	48	.03	26	.02
EBT	2	3400	850	.25*	1038	.31*
EBR	d	1700	83	.05	64	.04
WBL	1	1700	156	.09*	130	.08*
WBT	2	3400	171	.05	317	.09
WBR	1	1700	153	.09	149	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.55		.67

56 . Browning Av. at El Camino Real

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	55	.03	125	.07
NBT	2	3400	246	.09*	419	.15*
NBR	0	0	69		106	
SBL	1	1700	126	.07*	64	.04*
SBT	2	3400	345	.10	177	.05
SBR	1	1700	99	.06	78	.05
EBL	1	1700	87	.05	92	.05*
EBT	2	3400	225	.09*	207	.08
EBR	0	0	68		62	
WBL	1	1700	78	.05*	127	.07
WBT	2	3400	195	.06	490	.14*
WBR	1	1700	97	.06	182	.11
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.35		.43

58 . Browning Av. at Walnut Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	245	.14*	118	.07*
SBT	0	0	0		0	
SBR	1	1700	165	.10	81	.05
EBL	1	1700	129	.08*	80	.05*
EBT	2	3400	915	.27	621	.18
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	565	.20*	1124	.45*
WBR	0	0	121		416	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .47 .62

92 . Tustin Ranch Rd. at Bryan Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	122	.07*	505	.30
NBT	3	5100	510	.10	2039	.40*
NBR	1	1700	71	.04	137	.08
SBL	1	1700	181	.11	112	.07*
SBT	3	5100	2171	.43*	676	.13
SBR	1	1700	164	.10	212	.12
EBL	2	3400	100	.03	136	.04*
EBT	2	3400	639	.19*	712	.21
EBR	1	1700	391	.23	172	.10
WBL	2	3400	274	.08*	182	.05
WBT	2	3400	276	.08	1063	.31*
WBR	d	1700	71	.04	205	.12
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR EBR

TOTAL CAPACITY UTILIZATION .82 .87

93 . Tustin Ranch Rd. at El Camino Real

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	118	.03*	547	.16
NBT	3	5100	421	.08	2267	.44*
NBR	d	1700	122	.07	301	.18
SBL	2	3400	108	.03	169	.05*
SBT	3	5100	2568	.50*	815	.16
SBR	d	1700	151	.09	73	.04
EBL	1	1700	164	.10	101	.06*
EBT	2	3400	200	.12*	353	.16
EBR	0	0	545	.32	195	
WBL	1	1700	264	.16*	221	.13
WBT	2	3400	201	.09	482	.25*
WBR	0	0	95		357	
Right Turn Adjustment		EBR	.18*			
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION 1.04 .85

94 . Tustin Ranch Rd. at I-5 NB Ramps

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	330	.10*	671	.20*
NBT	3	5100	909	.18	1608	.32
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2520	.49*	979	.19*
SBR	f		40		449	
EBL	1.5		141	.08*	312	.09*
EBT	0	5100	0		0	
EBR	1.5		440	.13	281	{.02}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .53

95 . Tustin Ranch Rd. at I-5 SB Ramps

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	160	.05*	255	.08
NBT	3	5100	937	.18	1826	.36*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2394	.47*	958	.19
SBR	d	1700	570	.34	320	.19
EBL	1.5		703	{.29}*	577	.17*
EBT	0	5100	0	{.29}	0	
EBR	1.5		856		505	{.17}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .86 .58

96 . Tustin Ranch Rd. at Walnut Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	68	.02*	263	.08
NBT	3	5100	483	.09	1437	.28*
NBR	d	1700	179	.11	350	.21
SBL	2	3400	825	.24	304	.09*
SBT	3	5100	1798	.35*	702	.14
SBR	d	1700	316	.19	233	.14
EBL	2	3400	278	.08	210	.06*
EBT	2	3400	938	.28*	458	.13
EBR	d	1700	224	.13	121	.07
WBL	2	3400	393	.12*	248	.07
WBT	2	3400	597	.18	735	.22*
WBR	d	1700	481	.28	427	.25
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .82 .70

109 . Myford Rd. at Bryan Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	58	.03*	166	.10
NBT	2	3400	66	.02	396	.15*
NBR	0	0	16		107	
SBL	1	1700	98	.06	42	.02*
SBT	2	3400	353	.14*	111	.06
SBR	0	0	109		86	
EBL	1	1700	77	.05*	79	.05*
EBT	2	3400	676	.20	643	.19
EBR	d	1700	108	.06	80	.05
WBL	1	1700	179	.11	88	.05
WBT	2	3400	943	.28*	1023	.30*
WBR	d	1700	36	.02	76	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .57

110 . Myford Rd. at El Camino Real

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	41	.02	113	.07
NBT	2	3400	65	.03*	223	.13*
NBR	0	0	34		204	
SBL	1	1700	206	.12*	120	.07*
SBT	2	3400	149	.09	47	.03
SBR	0	0	275	.16	132	.08
EBL	1	1700	15	.01	240	.14*
EBT	2	3400	142	.08*	506	.18
EBR	0	0	244	.14	94	
WBL	1	1700	161	.09*	108	.06
WBT	2	3400	249	.08	595	.23*
WBR	0	0	31		187	
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .38 .62

111 . Franklin Av. at Walnut Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	97	.06*	246	.14*
NBT	2	3400	8	.00	11	.01
NBR	0	0	17	.01	14	.01
SBL	1	1700	38	.02	64	.04
SBT	2	3400	9	.01*	9	.01*
SBR	0	0	165	.10	459	.27
EBL	1	1700	401	.24*	234	.14*
EBT	2	3400	1055	.31	735	.22
EBR	d	1700	334	.20	130	.08
WBL	1	1700	67	.04	13	.01
WBT	2	3400	679	.20*	1634	.48*
WBR	d	1700	141	.08	70	.04
Right Turn Adjustment					SBR	.15*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.56		.97

445 . Tustin Ranch Rd. at Warner Av. N.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2.5	6800	321	.09*	1061	{.27}*
NBR	1.5		639	.19	1029	
SBL	2	3400	631	.19*	371	.11*
SBT	3	5100	1299	.25	579	.11
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2.5		901	.18*	621	
WBT	0	6800	0		0	{.15}*
WBR	1.5		319	{.05}	569	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .51 .58

446 . Tustin Ranch Rd. at Warner Av. S.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	286	.08*	434	.13
NBT	3	5100	403	.08	929	.18*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	697	.14*	269	.05
SBR	2	3400	1504	.44	926	.27
EBL	2	3400	557	.16*	1161	.34*
EBT	0	0	0		0	
EBR	1	1700	493	.29	601	.35
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			Multi	.25*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .57

447 . Armstrong Av. at Valencia Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	94	.03*	312	.09*
NBT	1	1700	52	.03	306	.18
NBR	d	1700	24	.01	176	.10
SBL	1	1700	29	.02	41	.02
SBT	1	1700	354	.28*	127	.12*
SBR	0	0	119		73	
EBL	1	1700	52	.03*	87	.05*
EBT	2	3400	226	.07	462	.14
EBR	1	1700	294	.17	153	.09
WBL	2	3400	152	.04	70	.02
WBT	2	3400	466	.14*	355	.12*
WBR	0	0	26		37	
Right Turn Adjustment			EBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .43

448 . Armstrong Av. at Warner Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	65	.02*	249	.07*
NBT	2	3400	19	.01	125	.06
NBR	0	0	27	.02	78	
SBL	1	1700	61	.04	36	.02
SBT	2	3400	88	.03*	51	.02*
SBR	1	1700	143	.08	113	.07
EBL	1	1700	106	.06	205	.12*
EBT	3	5100	1251	.25*	1235	.24
EBR	1	1700	196	.12	188	.11
WBL	1	1700	86	.05*	61	.04
WBT	3	5100	1212	.24	1287	.25*
WBR	1	1700	35	.02	69	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .40 .51

453 . Red Hill Ave. at Valencia Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	168	.05*	193	.06
NBT	3	5100	482	.09	2157	.42*
NBR	1	1700	111	.07	194	.11
SBL	2	3400	195	.06	115	.03*
SBT	3	5100	2005	.39*	622	.12
SBR	1	1700	235	.14	62	.04
EBL	1	1700	18	.01	148	.09*
EBT	2	3400	476	.14*	490	.14
EBR	1	1700	76	.04	75	.04
WBL	2	3400	133	.04*	115	.03
WBT	2	3400	546	.16	611	.18*
WBR	1	1700	77	.05	149	.09
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .77

454 . Tustin Ranch Rd. at Valencia Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	226	.07*	343	.10
NBT	3	5100	308	.06	1263	.25*
NBR	1	1700	7	.00	69	.04
SBL	2	3400	67	.02	174	.05*
SBT	3	5100	1850	.36*	733	.14
SBR	1	1700	572	.34	217	.13
EBL	2	3400	198	.06*	695	.20*
EBT	1	1700	6	.00	57	.03
EBR	1	1700	116	.07	159	.09
WBL	1	1700	78	.05	28	.02
WBT	2	3400	145	.04*	50	.01*
WBR	1	1700	66	.04	62	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .56

455 . North Loop Rd. at Edinger Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	119	.07*	207	.12*
NBT	1	1700	1	.00	1	.00
NBR	1	1700	31	.02	46	.03
SBL	1	1700	1	.00	1	.00
SBT	1	1700	1	.00*	1	.00*
SBR	1	1700	1	.00	1	.00
EBL	1	1700	1	.00	1	.00
EBT	3	5100	594	.12*	184	.04*
EBR	0	0	0		0	
WBL	1	1700	172	.10*	230	.14*
WBT	3	5100	224	.04	373	.07
WBR	1	1700	1	.00	1	.00
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .34 .35

456 . North Loop Rd. at Valencia Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	186	.11*	76	.04*
NBT	1	1700	88	.05	143	.08
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	1	1700	130	.08*	145	.09*
SBR	1	1700	54	.03	46	.03
EBL	1	1700	12	.01*	100	.06*
EBT	0	0	0		0	
EBR	1	1700	60	.04	169	.10
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					EBR	.01*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .25 .25

457 . North Loop Rd. at Moffett Dr.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	32	.01	61	.02*
NBR	1	1700	8	.00	100	.06
SBL	1	1700	32	.02	85	.05*
SBT	2	3400	108	.03*	65	.02
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	92	.05*	38	.02*
WBT	0	0	0		0	
WBR	1	1700	108	.06	32	.02
Right Turn Adjustment					NBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .13 .16

478 . Red Hill Ave. at I-5 NB Ramps

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	484	.28*	459	.27*
NBT	3	5100	815	.16	1041	.20
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1337	.26*	733	.14*
SBR	1	1700	563	.33	308	.18
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		509		399	
WBT	0.5	3400	3	.15*	49	.13*
WBR	1	1700	327	.19	503	.30
Right Turn Adjustment			SBR	.07*	Multi	.05*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .81 .64

479 . Red Hill Ave. at I-5 SB Ramps

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1050	.15*	1088	.16*
NBR	1	1700	603	.35	537	.32
SBL	1	1700	508	.30*	383	.23*
SBT	4	6800	1320	.19	738	.11
SBR	0	0	0		0	
EBL	0.5		242	{.14}*	412	{.24}*
EBT	0.5	1700	0	.14	0	.24
EBR	1	1700	437	.26	332	.20
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.20*	NBR	.16*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .84 .84

480 . Tustin Ranch Rd. at Edinger Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	19	.01*	131	.08*
NBT	0	0	0		0	
NBR	1	1700	3	.00	5	.00
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	647	.13*	197	.04
EBR	1	1700	227	.13	180	.11
WBL	2	3400	33	.01*	42	.01
WBT	3	5100	341	.07	565	.11*
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .20 .24

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\CumulativeBaseline+ExistGP\EXE-193\ICU\P30GP-C-TUS02-102809

732 . Newport Av. at SR-55 NB Ramps

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	200	.06*	511	.15*
NBT	3	5100	330	.10	1028	.24
NBR	0	0	204	.12	174	
SBL	1	1700	0	.00	49	.03
SBT	2	3400	1120	.33*	427	.13*
SBR	1	1700	199	.12	908	.53
EBL	2	3400	486	.14	527	.16*
EBT	1.5	3400	362	.16*	77	.04
EBR	0.5		197		68	
WBL	1	1700	72	.04*	186	.11
WBT	2	3400	81	.03	325	.12*
WBR	0	0	6		67	
Right Turn Adjustment					SBR	.28*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .64 .89

739 . Newport Av. at Mitchell Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01*	17	.01
NBT	3	5100	1024	.25	1662	.38*
NBR	0	0	234		260	
SBL	1	1700	95	.06	180	.11*
SBT	3	5100	2350	.48*	1326	.29
SBR	0	0	80		146	
EBL	1	1700	129	.08	105	.06*
EBT	1	1700	63	.05*	51	.04
EBR	0	0	25		24	
WBL	1	1700	178	.10*	190	.11
WBT	1	1700	50	.07	68	.12*
WBR	0	0	63		143	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .72

740 . Red Hill Ave. at Mitchell Av.

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	38	.02	154	.09
NBT	3	5100	1539	.33*	1275	.29*
NBR	0	0	148		179	
SBL	1	1700	309	.18*	175	.10*
SBT	3	5100	1164	.26	765	.17
SBR	0	0	137		82	
EBL	0.5		33	{.02}*	136	
EBT	0.5	1700	43	.04	187	.19*
EBR	1	1700	16	.01	64	.04
WBL	0.5		40		21	{.01}*
WBT	0.5	1700	35	.04*	114	.08
WBR	1	1700	108	.06	109	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .64

743 . Newport Avenue at Valencia

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	0	.00
NBT	1	1700	147	.09	654	.38*
NBR	d	1700	21	.01	60	.04
SBL	2	3400	963	.28	516	.15*
SBT	1	1700	853	.50*	362	.21
SBR	d	1700	0	.00	6	.00
EBL	1	1700	4	.00	5	.00
EBT	1	1700	5	.00*	4	.00*
EBR	d	1700	1	.00	8	.00
WBL	1	1700	77	.05*	58	.03*
WBT	1	1700	10	.01	4	.00
WBR	2	3400	599	.18	960	.28
Right Turn Adjustment					WBR	.14*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .75

745 . Tustin Ranch Road at Park Avenue

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	112	.03*	72	.02*
NBT	3	5100	373	.07	524	.10
NBR	1	1700	16	.01	16	.01
SBL	2	3400	71	.02	51	.02
SBT	3	5100	656	.13*	571	.11*
SBR	1	1700	452	.27	240	.14
EBL	2	3400	184	.05*	597	.18*
EBT	2	3400	73	.02	152	.04
EBR	1	1700	83	.05	204	.12
WBL	1	1700	61	.04	76	.04
WBT	1	1700	367	.22*	288	.17*
WBR	1	1700	133	.08	229	.13
Right Turn Adjustment			SBR	.10*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .53

746 . Kensington Park Drive at Edinger Avenue

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	61	.02*	207	.06*
NBT	0	0	0		0	
NBR	1	1700	40	.02	174	.10
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1930	.38	2426	.48*
EBR	1	1700	239	.14	93	.05
WBL	2	3400	211	.06	67	.02*
WBT	3	5100	2609	.51*	2053	.40
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.02*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .63

747 . Kensington Park Drive at Valencia Avenue

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	33	{.02}*	73	{.04}*
NBT	0	0	19		123	
NBR	0	0	38		194	
SBL	2	3400	57	.02	32	.01
SBT	0	0	212		25	
SBR	2	3400	50	.01	12	.00
EBL	2	3400	11	.00	40	.01
EBT	2	3400	194	.08	589	.19*
EBR	0	0	75		53	
WBL	0	0	252		84	{.05}*
WBT	2	3400	557	.24*	376	.14
WBR	1	1700	39	.02	68	.04
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .32 .33

748 . Armstrong Avenue at A Street

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	120	.07*	121	.07
NBT	2	3400	84	.02	261	.08*
NBR	d	1700	96	.06	128	.08
SBL	1	1700	106	.06	74	.04*
SBT	2	3400	212	.06*	127	.04
SBR	d	1700	132	.08	69	.04
EBL	2	3400	45	.01	136	.04
EBT	1	1700	489	.29*	598	.35*
EBR	d	1700	107	.06	116	.07
WBL	1	1700	92	.05*	117	.07*
WBT	1	1700	518	.30	550	.32
WBR	d	1700	41	.02	133	.08
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .59

749 . Park Avenue at A Street

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	224	.07*	479	.14*
NBT	1	1700	30	.02	50	.03
NBR	d	1700	126	.07	510	.30
SBL	1	1700	3	.00	6	.00
SBT	1	1700	61	.04*	47	.03*
SBR	d	1700	6	.00	6	.00
EBL	1	1700	6	.00	6	.00
EBT	2	3400	221	.07*	437	.13*
EBR	d	1700	464	.27	357	.21
WBL	1	1700	506	.30*	278	.16*
WBT	2	3400	430	.13	317	.09
WBR	d	1700	5	.00	4	.00
Right Turn Adjustment			EBR	.15*	NBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.68		.52

750 . Legacy Road at Warner Avenue

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	51	.03	79	.05
NBT	2	3400	83	.02*	97	.03*
NBR	1	1700	25	.01	55	.03
SBL	1	1700	67	.04*	201	.12*
SBT	2	3400	77	.02	64	.02
SBR	1	1700	135	.08	295	.17
EBL	2	3400	325	.10*	221	.07*
EBT	3	5100	890	.17	1084	.21
EBR	1	1700	118	.07	40	.02
WBL	2	3400	65	.02	26	.01
WBT	3	5100	1118	.22*	1017	.20*
WBR	1	1700	204	.12	132	.08
Right Turn Adjustment					SBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.43		.49

751 . Tustin Ranch Road at Legacy Road

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	103	.03*	82	.02
NBT	3	5100	482	.09	1451	.28*
NBR	1	1700	55	.03	84	.05
SBL	2	3400	95	.03	74	.02*
SBT	3	5100	1785	.35*	797	.16
SBR	1	1700	159	.09	62	.04
EBL	1	1700	27	.02	119	.07*
EBT	2	3400	29	.01*	62	.02
EBR	1	1700	64	.04	78	.05
WBL	1	1700	72	.04*	68	.04
WBT	2	3400	58	.02	46	.01*
WBR	1	1700	31	.02	105	.06
Right Turn Adjustment			EBR	.01*	WBR	.03*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.49		.46

752 . Legacy Road at North Loop Road

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	51	.03*	20	.01*
NBT	2	3400	60	.02	22	.01
NBR	d	1700	9	.01	7	.00
SBL	1	1700	5	.00	20	.01
SBT	2	3400	8	.00*	48	.01*
SBR	d	1700	27	.02	61	.04
EBL	1	1700	27	.02*	48	.03*
EBT	1	1700	36	.02	136	.08
EBR	1	1700	7	.00	36	.02
WBL	1	1700	5	.00	8	.00
WBT	1	1700	172	.10*	92	.05*
WBR	d	1700	23	.01	11	.01
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.20		.16

753 . Tustin Ranch Road at Edinger Avenue Conne

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	584	.11	1934	.38*
NBR	1	1700	3	.00	81	.05
SBL	1	1700	17	.01	49	.03*
SBT	3	5100	2383	.47*	1027	.20
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	114	.03*	103	.03*
WBT	0	0	0		0	
WBR	1	1700	148	.09	116	.07
Right Turn Adjustment					WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.55		.51

754 . Red Hill Ave. at Carnegie

P2030 Existing General Plan (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	109	.06*	26	.02
NBT	3	5100	594	.12	2551	.50*
NBR	1	1700	304	.18	280	.16
SBL	2	3400	565	.17	281	.08*
SBT	3	5100	1324	.26*	764	.15
SBR	d	1700	121	.07	11	.01
EBL	1	1700	9	.01*	147	.09
EBT	1	1700	120	.07	314	.18*
EBR	1	1700	8	.00	60	.04
WBL	1	1700	144	.08	245	.14*
WBT	0.5	3400	401	.24*	181	{.17}
WBR	1.5		179		497	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.62		.95

Appendix B-8 **Post-2030 Cumulative Baseline With Project (MPAH Network) ICU Worksheets**

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\MPAHwProject\EXE-193\ICU\P30WP-MPAH-C-COM01-110409

10 . SR-55 Frontage Rd. SB at Paularino Av.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	740		160	
SBT	2	3200	960	.53*	689	.27*
SBR	1	1600	190	.12	294	.18
EBL	0	0	0		0	
EBT	2	3200	1110	.40*	540	.21*
EBR	0	0	180		116	
WBL	1	1600	120	.08*	295	.18*
WBT	2	3200	230	.07	856	.27
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION 1.01 .66

11 . SR-55 Frontage Rd. NB at Paularino Av.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	121		163	
NBT	2	3200	749	.27*	862	.32*
NBR	d	1600	278	.17	216	.14
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	1	1600	262	.16	161	.10*
EBT	2	3200	1582	.49*	584	.18
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	229	.07	987	.31*
WBR	1	1600	259	.16	607	.38
Right Turn Adjustment					WBR	.07*

TOTAL CAPACITY UTILIZATION .76 .80

12 . SR-55 Frontage Rd. SB at Baker St.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	801	{.50}*	283	
SBT	2	3200	151	.30	360	.20*
SBR	1	1600	248	.16	497	.31
EBL	0	0	0		0	
EBT	1.5	4800	1959	.61*	857	.29*
EBR	1.5		276	.17	535	
WBL	1	1600	93	.06*	355	.22*
WBT	2	3200	532	.17	1433	.45
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.06*

TOTAL CAPACITY UTILIZATION 1.17 .77

13 . SR-55 Frontage Rd. NB at Baker St.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		402	.25	369	.23
NBT	1.5	4800	411	.26*	433	.27*
NBR	0		590	.37	508	.32
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	686	.21	330	.10*
EBT	2	3200	2040	.64*	732	.23
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	298	.09	1461	.46*
WBR	1	1600	193	.12	637	.40
Right Turn Adjustment			NBR	.11*		

TOTAL CAPACITY UTILIZATION 1.01 .83

50 . Red Hill Av. at Paularino Av.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	64	.02*	267	.08*
NBT	2	3200	357	.13	965	.31
NBR	0	0	68		41	
SBL	1	1600	80	.05	15	.01
SBT	2	3200	573	.20*	1037	.43*
SBR	0	0	62		332	
EBL	1	1600	151	.09	275	.17*
EBT	2	3200	1273	.46*	205	.10
EBR	0	0	199		112	
WBL	1	1600	79	.05*	111	.07
WBT	2	3200	384	.13	651	.23*
WBR	0	0	42		80	

TOTAL CAPACITY UTILIZATION .73 .91

51 . Red Hill Av. at Baker St.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	202	.06	644	.20*
NBT	2	3200	946	.32*	806	.26
NBR	0	0	92		19	
SBL	1	1600	21	.01*	8	.01
SBT	2	3200	520	.18	852	.40*
SBR	0	0	59		442	
EBL	1.5		712	{.25}*	590	.18*
EBT	1.5	4800	499	.25	174	.11
EBR	1	1600	730	.46	195	.12
WBL	1	1600	13	.01	103	.06
WBT	2	3200	61	.02*	414	.14*
WBR	0	0	16		34	
Right Turn Adjustment			EBR	.09*		

TOTAL CAPACITY UTILIZATION .69 .92

52 . Red Hill Av. at Bristol St.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	125	.04	69	.02
NBT	1.5	4800	563	.18*	190	.06*
NBR	1.5		79	.05	21	
SBL	2	3200	253	.08*	616	.19*
SBT	2	3200	155	.05	637	.20
SBR	1	1600	28	.02	356	.22
EBL	2	3200	345	.11*	184	.06*
EBT	3	4800	748	.16	606	.13
EBR	1	1600	58	.04	89	.06
WBL	2	3200	77	.02	112	.04
WBT	3	4800	467	.10*	1066	.22*
WBR	1	1600	721	.45	372	.23
Right Turn Adjustment			WBR	.29*		

TOTAL CAPACITY UTILIZATION .76 .53

541 . Bear St. at Baker St.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	64	.04	216	.14*
NBT	1	1600	136	.12*	266	.20
NBR	0	0	60		49	
SBL	2	3200	485	.15*	270	.08
SBT	1	1600	233	.15	232	.15*
SBR	2	3200	272	.09	471	.15
EBL	2	3200	429	.13	291	.09*
EBT	2	3200	1305	.46*	782	.28
EBR	0	0	166		124	
WBL	1	1600	70	.04*	75	.05
WBT	3	4800	384	.08	1512	.32*
WBR	1	1600	145	.09	193	.12

TOTAL CAPACITY UTILIZATION .77 .70

542 . Bear St. at Paularino Av.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	102	.06	27	.02
NBT	3	4800	1215	.26*	1867	.42*
NBR	0	0	28		170	
SBL	1	1600	136	.09*	166	.10*
SBT	3	4800	1000	.27	1128	.24
SBR	0	0	297		32	
EBL	1	1600	148	.09*	24	.02
EBT	1	1600	26	.04	6	.03*
EBR	0	0	37		39	
WBL	1	1600	7	.00	140	.09*
WBT	1	1600	23	.01*	21	.01
WBR	1	1600	71	.04	229	.14

TOTAL CAPACITY UTILIZATION .45 .64

545 . Bristol St. at Sunflower Av.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	3	4800	215	.04	612	.13
NBT	2.5	6400	946	.20*	1839	.38*
NBR	1.5		350	{.16}	199	.12
SBL	2	3200	306	.10*	184	.06*
SBT	3	4800	1208	.25	1066	.22
SBR	1	1600	155	.10	270	.17
EBL	2	3200	120	.04	345	.11
EBT	2.5	6400	1264	{.28}*	1177	.25*
EBR	1.5		576		388	.24
WBL	2	3200	266	.08*	306	.10*
WBT	4	6400	340	.05	579	.09
WBR	d	1600	205	.13	346	.22

TOTAL CAPACITY UTILIZATION .66 .79

546 . Bristol St. at Anton Blvd.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	78	.02	489	.15
NBT	4	6400	1188	.19*	2130	.33*
NBR	f		1241		745	
SBL	2	3200	280	.09*	261	.08*
SBT	4	6400	1502	.23	1431	.22
SBR	1	1600	21	.01	56	.04
EBL	1	1600	24	.02	110	.07
EBT	1	1600	69	.04*	94	.06*
EBR	1	1600	17	.01	206	.13
WBL	3	4800	550	.11*	1143	.24*
WBT	1	1600	30	.02	125	.08
WBR	1	1600	178	.11	360	.23

TOTAL CAPACITY UTILIZATION .43 .71

547 . Bristol St. at Paularino Av.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	29	.01	102	.03*
NBT	4	6400	1156	.20*	1527	.26
NBR	0	0	107		117	
SBL	2	3200	550	.17*	344	.11
SBT	3	4800	1138	.24	1743	.38*
SBR	0	0	29		104	
EBL	1	1600	222	.14	137	.09*
EBT	1	1600	393	.25*	179	.11
EBR	1	1600	25	.02	44	.03
WBL	2	3200	57	.02*	203	.06
WBT	1	1600	142	.09	534	.33*
WBR	1	1600	212	.13	455	.28

TOTAL CAPACITY UTILIZATION .64 .83

548 . Bristol St. at Baker St.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	78	.02	145	.05
NBT	4	6400	502	.08*	897	.14*
NBR	1	1600	223	.14	179	.11
SBL	2	3200	483	.15*	459	.14*
SBT	3	4800	600	.13	860	.18
SBR	1	1600	182	.11	581	.36
EBL	3	4800	363	.08	308	.06*
EBT	3	4800	1444	.32*	633	.15
EBR	0	0	71		79	
WBL	2	3200	129	.04*	261	.08
WBT	3	4800	340	.07	1064	.22*
WBR	1	1600	335	.21	664	.42
Right Turn Adjustment			NBR	.03*	Multi	.17*

TOTAL CAPACITY UTILIZATION .62 .73

549 . Bristol St. at Newport Blvd. SB

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	199	.06*	633	.20*
NBT	3	4800	900	.19	1290	.27
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	870	.18*	650	.14*
SBR	d	1600	281	.18	517	.32
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					SBR	.18*

TOTAL CAPACITY UTILIZATION .24 .52

550 . Bristol St. at Newport Blvd. NB

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	644	.13	1350	.28*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	805	.17*	680	.14
SBR	0	0	0		0	
EBL	1.5		431	{.15}*	397	.12*
EBT	0	4800	0	.15	0	
EBR	1.5		290		204	{.02}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .32 .40

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\MPAHwProject\EXE-193\ICU\P30WP-MPAH-C-COM02-110409

715 . Bristol St. at I-405 NB Ramps

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6400	1971	.31*	2325	.36*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	5	8000	2157	.27	2495	.32
SBR	0	0	23		69	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	2	3200	50	.02	306	.10
WBL	1.5		108		217	
WBT	1.5	4800	77	.04*	313	.11*
WBR	2	3200	554	.17	814	.25
Right Turn Adjustment			WBR	.13*	Multi	.21*
TOTAL CAPACITY UTILIZATION				.48		.68

716 . Bristol St. at I-405 SB Ramps

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	177	.11*	256	.16*
NBT	4	6400	1461	.23	2521	.39
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	1349	.28*	1905	.40*
SBR	f		903		1289	
EBL	3	4800	689	.14*	638	.13*
EBT	0	0	0		0	
EBR	1	1600	611	.38	202	.13
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.16*		
TOTAL CAPACITY UTILIZATION				.69		.69

717 . Bear St. at SR-73 SB Ramps

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3200	387	.24*	984	.38*
NBR	0	0	452	.28	242	
SBL	2	3200	716	.22*	1168	.37*
SBT	2	3200	604	.19	1234	.39
SBR	0	0	0		0	
EBL	1.5		167	.10*	266	{.14}*
EBT	0	3200	0		0	.14
EBR	0.5		363	.23	186	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
TOTAL CAPACITY UTILIZATION				.56		.89

718 . Bear St. at SR-73 NB Ramps

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	94	.03*	318	.10*
NBT	2	3200	399	.12	732	.23
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	4800	1057	.25*	1314	.34*
SBR	0	0	136		302	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	163	.10*	276	.17*
WBT	0	0	0		0	
WBR	2	3200	791	.25	1248	.39
Right Turn Adjustment			WBR	.03*	WBR	.06*
TOTAL CAPACITY UTILIZATION				.41		.67

721 . Flower St. at Sunflower Av.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	65	.04*	69	.04*
NBT	2	3200	195	.06	509	.16
NBR	1	1600	89	.06	91	.06
SBL	1	1600	150	.09	67	.04
SBT	2	3200	390	.16*	333	.18*
SBR	0	0	130		240	
EBL	2	3200	95	.03	230	.07*
EBT	3	4800	820	.19*	661	.16
EBR	0	0	85		117	
WBL	2	3200	96	.03*	99	.03
WBT	3	4800	355	.09	1111	.25*
WBR	0	0	60		81	

TOTAL CAPACITY UTILIZATION .42 .54

722 . Anton Blvd. at Sunflower Av.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	25	.02*	24	.02*
NBT	0	0	0		0	
NBR	2	3200	401	.13	674	.21
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	1139	.25*	710	.16*
EBR	0	0	58		57	
WBL	2	3200	362	.11*	525	.16*
WBT	3	4800	495	.10	1410	.29
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.03*	NBR	.07*

TOTAL CAPACITY UTILIZATION .41 .41

726 . Main St. at Sunflower Av.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	512	.16*	1290	.40*
NBT	3	4800	258	.05	860	.18
NBR	0	0	3		1	
SBL	1	1600	9	.01	1	.00
SBT	2	3200	540	.17*	338	.11*
SBR	1	1600	260	.16	551	.34
EBL	1.5		484	{.15}*	546	{.17}*
EBT	0.5	3200	0	.15	0	.17
EBR	2	3200	1086	.34	714	.22
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.07*	SBR	.10*

TOTAL CAPACITY UTILIZATION .55 .78

735 . Newport Blvd. NB at Del Mar Av./University Dr.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	135		183	
NBT	3	4800	1145	.27*	675	.18*
NBR	1	1600	211	.13	193	.12
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	778	.24*	453	.14*
EBT	2	3200	722	.23	687	.21
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1.5	4800	346	.16*	597	.19*
WBR	1.5		443		293	.18

TOTAL CAPACITY UTILIZATION .67 .51

736 . Newport Blvd. SB at Del Mar Av./University

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	157	.10	299	.19
SBT	3	4800	468	.10*	1429	.30*
SBR	f		507		1191	
EBL	0	0	0		0	
EBT	4	6400	1263	.20*	801	.13*
EBR	0	0	45		59	
WBL	1	1600	168	.11*	162	.10*
WBT	2	3200	333	.10	619	.19
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .41 .53

737 . Newport Blvd. NB at Mesa Dr.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	18	.01	20	.01
NBT	2	3200	490	.19*	377	.14*
NBR	0	0	128		72	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3200	91	.03	86	.03*
EBT	1	1600	142	.09*	272	.17
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	1	1600	62	.06	222	.16*
WBR	0	0	39		32	

TOTAL CAPACITY UTILIZATION .28 .33

738 . Newport Blvd. SB at Mesa Dr.

P2030 MPAH With Project (COSTA MESA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	231	.14	376	.24
SBT	4	6400	1119	.17*	2774	.43*
SBR	1	1600	0	.00	0	.00
EBL	0	0	0		0	
EBT	1	1600	0	.00*	0	.00*
EBR	1	1600	0	.00	0	.00
WBL	1	1600	80	.05*	269	.17*
WBT	1	1600	0	.00	0	.00
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .22 .60

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\MPAHwProject\EXE-193\ICU\P30WP-MPAH-C-IRV01-110409

42 . Red Hill Av. at Barranca Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	335	.10*	821	.24
NBT	4	6800	690	.10	2137	.31*
NBR	d	1700	106	.06	207	.12
SBL	2	3400	446	.13	461	.14*
SBT	4	6800	1165	.17*	751	.11
SBR	d	1700	209	.12	239	.14
EBL	2	3400	328	.10	291	.09*
EBT	4	6800	1321	.25*	892	.16
EBR	0	0	381		198	
WBL	2	3400	358	.11*	141	.04
WBT	4	6800	748	.11	920	.14*
WBR	1	1700	264	.16	572	.34
Right Turn Adjustment					WBR	.09*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .82

43 . Red Hill Av. at Deere Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	125	.07*	40	.02
NBT	4	6800	1086	.16	2928	.43*
NBR	d	1700	123	.07	41	.02
SBL	1	1700	85	.05	29	.02*
SBT	4	6800	1660	.24*	1135	.17
SBR	d	1700	100	.06	14	.01
EBL	1	1700	14	.01	84	.05
EBT	1	1700	52	.06*	80	.12*
EBR	0	0	45		119	
WBL	1	1700	15	.01*	96	.06*
WBT	1	1700	15	.01	56	.03
WBR	1	1700	30	.02	227	.13
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .43 .68

44 . Red Hill Av. at Alton Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	267	.16	257	.15
NBT	4	6800	855	.17*	2199	.39*
NBR	0	0	348	.20	454	
SBL	1	1700	333	.20*	309	.18*
SBT	4	6800	1110	.16	886	.13
SBR	d	1700	297	.17	165	.10
EBL	1	1700	179	.11	172	.10
EBT	2	3400	1011	.30*	1177	.35*
EBR	1	1700	449	.26	340	.20
WBL	2	3400	565	.17*	454	.13*
WBT	2	3400	1089	.32	1108	.33
WBR	1	1700	247	.15	689	.41
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .89 1.10

45 . Red Hill Av. at McGaw Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	617	.18*	257	.08
NBT	4	6800	1305	.19	2366	.35*
NBR	1	1700	273	.16	208	.12
SBL	2	3400	347	.10	102	.03*
SBT	4	6800	1601	.24*	1555	.23
SBR	d	1700	107	.06	141	.08
EBL	1	1700	47	.03*	143	.08
EBT	2	3400	80	.05	200	.12*
EBR	0	0	192	.11	437	.26
WBL	2	3400	287	.08	309	.09*
WBT	2	3400	196	.10*	122	.07
WBR	0	0	128		311	.18
Right Turn Adjustment					Multi	.06*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .70

47 . Red Hill Av. at MacArthur Blvd.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	89	.03	475	.14
NBT	4	6800	1012	.16*	1384	.22*
NBR	0	0	73		133	
SBL	2	3400	447	.13*	640	.19*
SBT	3	5100	1287	.25	947	.19
SBR	f		354		1034	
EBL	2	3400	844	.25*	664	.20*
EBT	4	6800	720	.11	356	.05
EBR	d	1700	181	.11	169	.10
WBL	1	1700	132	.08	143	.08
WBT	4	6800	517	.08*	971	.14*
WBR	f		814		965	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.67		.80

48 . Red Hill Av. at Sky Park N

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	35	.02	35	.02
NBT	4	6800	1060	.16*	1632	.24*
NBR	d	1700	71	.04	42	.02
SBL	1	1700	171	.10*	89	.05*
SBT	4	6800	1217	.18	1116	.16
SBR	d	1700	158	.09	54	.03
EBL	1	1700	20	.01*	83	.05*
EBT	1	1700	21	.01	29	.02
EBR	1	1700	18	.01	48	.03
WBL	1	1700	18	.01	106	.06
WBT	1	1700	20	.07*	71	.20*
WBR	0	0	102		264	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.39		.59

49 . Red Hill Av. at Main St.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	268	.08	425	.13
NBT	3	5100	935	.18*	1250	.25*
NBR	f		370		278	
SBL	2	3400	161	.05*	218	.06*
SBT	4	6800	780	.11	806	.12
SBR	f		231		478	
EBL	2	3400	285	.08	350	.10
EBT	3	5100	1269	.32*	1124	.30*
EBR	0	0	360		418	
WBL	2	3400	180	.05*	356	.10*
WBT	3	5100	511	.12	1297	.29
WBR	0	0	111		159	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.65		.76

70 . Gillette Av. at Main St.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	61	.02*	254	.07
NBT	1	1700	5	.00	27	.02*
NBR	1	1700	35	.02	510	.30
SBL	2	3400	41	.01	312	.09*
SBT	1	1700	24	.01*	17	.01
SBR	d	1700	47	.03	281	.17
EBL	2	3400	325	.10*	106	.03*
EBT	4	6800	1074	.16	1483	.22
EBR	f		290		72	
WBL	2	3400	286	.08	70	.02
WBT	3	5100	1152	.23*	1120	.22*
WBR	1	1700	300	.18	37	.02
Right Turn Adjustment					Multi	.37*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.41		.78

71 . Armstrong St. at Barranca Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	60	.04*	212	.12*
NBT	1	1700	59	.03	186	.11
NBR	1	1700	92	.05	264	.16
SBL	1	1700	88	.05	115	.07
SBT	1	1700	84	.05*	114	.07*
SBR	1	1700	58	.03	92	.05
EBL	1	1700	91	.05	99	.06
EBT	4	6800	1314	.19*	1271	.19*
EBR	d	1700	141	.08	135	.08
WBL	1	1700	235	.14*	171	.10*
WBT	4	6800	1496	.25	1215	.20
WBR	0	0	170		125	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .47 .53

77 . MacArthur Bl. at Sky Park E.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	116	.07*	92	.05
NBT	4	6800	1327	.20	1988	.29*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6800	1243	.20*	1042	.16
SBR	0	0	144		68	
EBL	2	3400	33	.01*	168	.05*
EBT	0	0	0		0	
EBR	1	1700	67	.04	252	.15
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .33 .39

78 . MacArthur Bl. at Main St.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	829	.24*	724	.21*
NBT	4	6800	1035	.15	1496	.22
NBR	f		1250		520	
SBL	2	3400	412	.12	247	.07
SBT	4	6800	856	.13*	1201	.18*
SBR	1	1700	109	.06	93	.05
EBL	1	1700	101	.06	99	.06
EBT	3	5100	568	.11*	613	.12*
EBR	1	1700	446	.26	718	.42
WBL	2	3400	328	.10*	631	.19*
WBT	3	5100	483	.09	573	.11
WBR	f		214		605	
Right Turn Adjustment					EBR	.09*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .63 .84

79 . MacArthur Bl. at I-405 NB Ramps

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	2404	.35*	2320	.34*
NBR	2	3400	229	.07	888	.26
SBL	2	3400	211	.06*	642	.19*
SBT	4	6800	1575	.23	1990	.29
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	965	.28*	590	.17*
WBT	0	0	0		0	
WBR	2	3400	666	.20	340	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .75

80 . MacArthur Bl. at I-405 SB Ramps

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1530	.23*	2487	.37*
NBR	1	1700	386	.23	730	.43
SBL	2	3400	228	.07*	603	.18*
SBT	4	6800	1667	.25	1589	.23
SBR	1	1700	630	.37	458	.27
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	1004	.30*	693	.20*
WBT	1	1700	264	.16	299	.18
WBR	f		1131		581	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .80

82 . MacArthur Bl. at Michelson Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	287	.08*	173	.05
NBT	4	6800	1375	.20	1833	.27*
NBR	1	1700	317	.19	145	.09
SBL	2	3400	399	.12	807	.24*
SBT	4	6800	2201	.32*	1970	.29
SBR	0	0	0		0	
EBL	2	3400	287	.08*	467	.14
EBT	2	3400	196	.07	238	.11*
EBR	0	0	58		135	
WBL	2	3400	155	.05	575	.17*
WBT	1	1700	144	.08*	97	.06
WBR	1	1700	292	.17	730	.43
Right Turn Adjustment					WBR	.05*
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for WBR

TOTAL CAPACITY UTILIZATION .61 .89

83 . MacArthur Bl. at Douglas Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1690	.26*	1617	.25
NBR	0	0	67		64	
SBL	2	3400	463	.14*	306	.09
SBT	4	6800	1791	.26	2326	.34*
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	49	.03*	64	.04*
WBT	0	0	0		0	
WBR	1	1700	250	.15	433	.25
Right Turn Adjustment			WBR	.01*	WBR	.14*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .49 .57

87 . Dupont Dr. at Michelson Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	124	.07*	270	.16*
NBT	2	3400	63	.03	87	.05
NBR	0	0	44		113	.07
SBL	1	1700	31	.02	126	.07
SBT	2	3400	19	.01*	74	.04*
SBR	0	0	30	.02	110	.06
EBL	1	1700	76	.04	86	.05*
EBT	2	3400	695	.29*	591	.20
EBR	0	0	295		97	
WBL	1	1700	36	.02*	49	.03
WBT	3	5100	486	.12	960	.21*
WBR	0	0	141		107	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .44 .51

97 . Von Karman Av. at Barranca Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	290	.09*	537	.16*
NBT	2	3400	437	.13	605	.18
NBR	f		283		801	
SBL	2	3400	113	.03	274	.08
SBT	2	3400	597	.18*	630	.19*
SBR	2	3400	120	.04	189	.06
EBL	2	3400	126	.04	100	.03
EBT	4	6800	694	.10*	1196	.18*
EBR	1	1700	400	.24	306	.18
WBL	2	3400	663	.20*	294	.09*
WBT	4	6800	1200	.18	784	.12
WBR	1	1700	207	.12	94	.06
Right Turn Adjustment			EBR	.07*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .67

98 . Von Karman Av. at Alton Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	201	.12*	383	.23
NBT	3	5100	753	.15	1638	.32*
NBR	d	1700	120	.07	554	.33
SBL	1	1700	66	.04	330	.19*
SBT	3	5100	1495	.29*	725	.14
SBR	d	1700	88	.05	216	.13
EBL	1	1700	136	.08*	132	.08
EBT	3	5100	924	.18	1836	.36*
EBR	d	1700	220	.13	259	.15
WBL	1	1700	495	.29	186	.11*
WBT	3	5100	2021	.40*	1231	.24
WBR	d	1700	241	.14	159	.09
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .94 1.03

99 . Von Karman Av. at McGaw Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	114	.07*	60	.04
NBT	3	5100	884	.17	2799	.55*
NBR	d	1700	60	.04	205	.12
SBL	1	1700	65	.04	60	.04*
SBT	3	5100	2080	.41*	1052	.21
SBR	d	1700	76	.04	39	.02
EBL	1	1700	31	.02	86	.05
EBT	2	3400	225	.09*	527	.19*
EBR	0	0	94		120	
WBL	1	1700	206	.12*	62	.04*
WBT	2	3400	490	.16	262	.11
WBR	0	0	65		126	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .87

100 . Von Karman Av. at Main St.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	305	.09*	371	.11
NBT	3	5100	887	.17	1856	.36*
NBR	1	1700	198	.12	340	.20
SBL	1	1700	128	.08	172	.10*
SBT	3	5100	1753	.34*	1188	.23
SBR	1	1700	418	.25	193	.11
EBL	2	3400	318	.09*	698	.21
EBT	3	5100	554	.11	1488	.29*
EBR	f		329		282	
WBL	2	3400	318	.09	230	.07*
WBT	3	5100	986	.19*	685	.13
WBR	1	1700	106	.06	145	.09
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .87

101 . Von Karman Av. at Morse Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	298	.09*	91	.03
NBT	3	5100	1424	.31	2247	.45*
NBR	0	0	137		24	
SBL	1	1700	146	.09	64	.04*
SBT	3	5100	1724	.34*	1622	.32
SBR	f		140		39	
EBL	1	1700	18	.01*	57	.03*
EBT	1	1700	6	.00	2	.00
EBR	f		55		283	
WBL	1	1700	11	.01	115	.07
WBT	1	1700	1	.03*	9	.11*
WBR	0	0	58		186	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .68

102 . Von Karman Av. at Michelson Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	47	.03	51	.03
NBT	2	3400	1330	.39*	1560	.46*
NBR	1	1700	109	.06	94	.06
SBL	1	1700	530	.31*	437	.26*
SBT	2	3400	1430	.42	1772	.52
SBR	1	1700	261	.15	270	.16
EBL	2	3400	238	.07	366	.11*
EBT	2	3400	262	.09*	519	.18
EBR	0	0	39		76	
WBL	1	1700	194	.11*	172	.10
WBT	2	3400	443	.13	689	.20*
WBR	f		635		755	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .95 1.08

103 . Von Karman Av. at Dupont Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	98	.06	63	.04*
NBT	2	3400	1404	.43*	1395	.45
NBR	0	0	51		125	
SBL	1	1700	134	.08*	120	.07
SBT	2	3400	1268	.37	1619	.48*
SBR	1	1700	55	.03	38	.02
EBL	1	1700	6	.00	26	.02*
EBT	2	3400	105	.05*	215	.11
EBR	0	0	77		169	
WBL	1	1700	125	.07*	92	.05
WBT	2	3400	166	.09	249	.14*
WBR	0	0	129		219	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .68 .73

104 . Von Karman Av. at Martin

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	38	.02*	31	.02*
NBT	2	3400	1355	.40	1351	.40
NBR	1	1700	16	.01	34	.02
SBL	1	1700	32	.02	33	.02
SBT	2	3400	1116	.42*	1610	.53*
SBR	0	0	301		207	
EBL	2	3400	118	.03*	203	.06*
EBT	1	1700	2	.02	3	.03
EBR	0	0	32		47	
WBL	1	1700	2	.00	23	.01
WBT	1	1700	1	.00*	12	.04*
WBR	0	0	6		56	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .70

112 . Myford Rd. at Michelle Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	59	.03*	37	.02
NBT	2	3400	67	.04	359	.17*
NBR	0	0	65		234	
SBL	1	1700	119	.07	108	.06*
SBT	2	3400	283	.12*	84	.03
SBR	0	0	108		18	
EBL	1	1700	6	.00	61	.04
EBT	2	3400	58	.02	375	.11*
EBR	d	1700	15	.01	33	.02
WBL	1	1700	85	.05	50	.03*
WBT	2	3400	296	.10*	101	.06
WBR	0	0	38		100	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .30 .42

113 . Myford Rd. at Walnut Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	9	.01*	111	.07
NBT	1	1700	5	.00	121	.07*
NBR	f		66		293	
SBL	2	3400	101	.03	155	.05*
SBT	1	1700	32	.02*	12	.01
SBR	1	1700	234	.14	146	.09
EBL	1	1700	75	.04	76	.04*
EBT	2	3400	863	.25*	812	.24
EBR	d	1700	53	.03	10	.01
WBL	2	3400	325	.10*	37	.01
WBT	2	3400	846	.25	1063	.31*
WBR	1	1700	150	.09	123	.07
Right Turn Adjustment			SBR	.04*	SBR	.01*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .47 .53

114 . Millikan Av. at Barranca Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	139	.08*	35	.02
NBT	2	3400	53	.02	20	.01*
NBR	d	1700	129	.08	396	.23
SBL	2	3400	65	.02	269	.08*
SBT	0.5	3400	29	.02*	60	.04
SBR	1.5		37	{.01}	28	
EBL	2	3400	41	.01*	35	.01
EBT	4	6800	777	.14	1933	.30*
EBR	0	0	164		99	
WBL	1	1700	146	.09	111	.07*
WBT	4	6800	1640	.24*	903	.13
WBR	1	1700	170	.10	588	.35
Right Turn Adjustment					NBR	.17*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .40 .68

115 . Millikan Av. at Alton Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	21	.01*	57	.03
NBT	1	1700	5	.00	24	.01*
NBR	1	1700	24	.01	68	.04
SBL	1	1700	36	.02	86	.05*
SBT	1	1700	10	.01*	10	.01
SBR	1	1700	144	.08	249	.15
EBL	1	1700	168	.10*	281	.17*
EBT	3	5100	910	.18	2001	.39
EBR	d	1700	54	.03	38	.02
WBL	1	1700	105	.06	33	.02
WBT	3	5100	2105	.41*	1208	.24*
WBR	d	1700	117	.07	76	.04
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*	.	.05*

TOTAL CAPACITY UTILIZATION .58 .53

116 . Cartwright Rd. at Main St.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	44	.03*	86	.05*
NBT	1	1700	2	.00	2	.00
NBR	1	1700	54	.03	241	.14
SBL	2	3400	9	.00	96	.03
SBT	1	1700	3	.01*	4	.04*
SBR	0	0	18		60	
EBL	1	1700	53	.03*	19	.01
EBT	3	5100	661	.13	1925	.38*
EBR	1	1700	85	.05	35	.02
WBL	2	3400	193	.06	61	.02*
WBT	3	5100	1403	.28*	1220	.24
WBR	1	1700	75	.04	9	.01
Right Turn Adjustment					NBR	.06*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.40		.60

119 . Teller Av. at Michelson Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	89	.03	220	.06
NBT	1	1700	15	.03*	0	.28*
NBR	0	0	36		479	
SBL	1	1700	317	.19*	181	.11*
SBT	1	1700	141	.08	64	.04
SBR	1	1700	321	.19	165	.10
EBL	1	1700	44	.03	189	.11*
EBT	3	5100	580	.11*	1039	.20
EBR	1	1700	264	.16	224	.13
WBL	1	1700	446	.26*	42	.02
WBT	3	5100	1496	.29	945	.19*
WBR	1	1700	71	.04	81	.05
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.64		.74

126 . Jamboree Rd. at Bryan Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	117	.03*	268	.08
NBT	4	6800	693	.10	2031	.30*
NBR	1	1700	181	.11	439	.26
SBL	2	3400	349	.10	85	.03*
SBT	4	6800	2382	.35*	965	.14
SBR	d	1700	128	.08	199	.12
EBL	2	3400	64	.02	230	.07
EBT	2	3400	432	.13*	546	.16*
EBR	d	1700	204	.12	116	.07
WBL	2	3400	559	.16*	349	.10*
WBT	2	3400	556	.16	592	.17
WBR	1	1700	274	.16	239	.14
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.72		.64

127 . Jamboree Rd. at El Camino Real

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	274	.08*	466	.14
NBT	4	6800	815	.12	1747	.26*
NBR	1	1700	590	.35	312	.18
SBL	1	1700	212	.12	124	.07*
SBT	4	6800	2582	.38*	990	.15
SBR	1	1700	156	.09	198	.12
EBL	1	1700	81	.05	212	.12
EBT	1	1700	153	.09*	193	.11*
EBR	2	3400	196	.06	326	.10
WBL	2	3400	369	.11*	735	.22*
WBT	2	3400	82	.04	256	.13
WBR	0	0	67		201	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.71		.71

128 . Jamboree Rd. at I-5 NB Ramps

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1336	.20	2638	.39*
NBR	f		670		680	
SBL	0	0	0		0	
SBT	4	6800	1911	.28*	1761	.26
SBR	f		470		480	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		1129	.33*	399	.23*
WBT	0	5100	0		0	
WBR	1.5		514	.30	982	.29
Right Turn Adjustment					WBR	.06*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .73

129 . Jamboree Rd. at I-5 SB Ramps

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1520	.22	2546	.37*
NBR	f		405		1090	
SBL	0	0	0		0	
SBT	4	6800	2242	.33*	1645	.24
SBR	f		623		510	
EBL	2	3400	494	.15*	674	.20*
EBT	0	0	0		0	
EBR	2	3400	936	.28	745	.22
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.13*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .62

130 . Jamboree Rd. at Michelle Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	393	.23*	278	.16*
NBT	4	6800	1471	.22	3063	.45
NBR	d	1700	0	.00	0	.00
SBL	1	1700	0	.00	0	.00
SBT	4	6800	3252	.48*	2166	.32*
SBR	d	1700	553	.33	292	.17
EBL	2	3400	137	.04*	545	.16*
EBT	0.5	3400	20	{.01}	40	{.06}
EBR	1.5		214		365	
WBL	1	1700	3	.00	8	.00
WBT	1	1700	5	.00*	10	.01*
WBR	0	0	2		12	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .80 .70

131 . Jamboree Rd. SB at Walnut Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	439	.13	363	.11
SBT	2	3400	707	.21*	738	.22*
SBR	1	1700	304	.18	170	.10
EBL	0	0	0		0	
EBT	3	5100	461	.09*	597	.12*
EBR	1	1700	208	.12	374	.22
WBL	2	3400	315	.09*	318	.09*
WBT	3	5100	486	.10	820	.16
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.03*	EBR	.10*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .47 .58

132 . Jamboree Rd. NB at Walnut Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	293	.09	609	.18
NBT	2	3400	468	.14*	698	.21*
NBR	d	1700	378	.22	553	.33
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	2	3400	37	.01	213	.06*
EBT	3	5100	862	.17*	817	.16
EBR	0	0	0		0	
WBL	0	0	4		0	
WBT	3	5100	837	.16	901	.18*
WBR	1	1700	515	.30	609	.36
Right Turn Adjustment			Multi	.22*	Multi	.24*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.58		.74

133 . Jamboree Rd. at Edinger Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	87	.03	195	.06
NBT	0	0	0		0	
NBR	1	1700	133	.08	397	.23
SBL	2	3400	490	.14*	565	.17*
SBT	0	0	0		0	
SBR	f		1000		387	
EBL	2	3400	282	.08*	700	.21*
EBT	3	5100	807	.16	879	.19
EBR	0	0	12		85	
WBL	2	3400	228	.07	195	.06
WBT	3	5100	1173	.23*	968	.19*
WBR	1	1700	608	.36	430	.25
Right Turn Adjustment			WBR	.02*	NBR	.07*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.52		.69

134 . Loop Rd. at Warner Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	26	.02	72	.04
NBT	2	3400	9	.00*	190	.06*
NBR	1	1700	104	.06	442	.26
SBL	1	1700	170	.10*	206	.12*
SBT	2	3400	125	.04	265	.08
SBR	f		1019		289	
EBL	2	3400	48	.01	40	.01
EBT	2	3400	870	.26*	2027	.60*
EBR	1	1700	72	.04	26	.02
WBL	2	3400	133	.04*	336	.10*
WBT	2	3400	871	.26	733	.22
WBR	1	1700	12	.01	33	.02
Right Turn Adjustment			NBR	.03*	NBR	.12*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.48		1.05

136 . Jamboree Rd. at Barranca Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	214	.06*	299	.09
NBT	4	6800	1329	.20	3251	.48*
NBR	f		159		292	
SBL	2	3400	397	.12	406	.12*
SBT	4	6800	3326	.49*	1828	.27
SBR	f		1035		387	
EBL	2.5		239	.07	1173	
EBT	2.5	8500	724	.14*	921	.25*
EBR	f		128		158	
WBL	2	3400	266	.08	304	.09
WBT	3	5100	761	.15*	934	.18*
WBR	f		213		486	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing

TOTAL CAPACITY UTILIZATION .89 1.08

137 . Jamboree Rd. at Beckman Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	44	.03*	19	.01
NBT	5	8500	1519	.19	3672	.44*
NBR	0	0	129		53	
SBL	1	1700	53	.03	64	.04*
SBT	5	8500	3740	.46*	2163	.26
SBR	0	0	168		78	
EBL	1	1700	114	.07*	226	.13*
EBT	1	1700	18	.01	32	.02
EBR	d	1700	10	.01	12	.01
WBL	1	1700	120	.07	56	.03
WBT	1	1700	38	.06*	23	.04*
WBR	0	0	56		52	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .70

138 . Jamboree Rd. at Alton Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	454	.13*	309	.09
NBT	5	8500	1171	.14	2956	.35*
NBR	1	1700	186	.11	164	.10
SBL	2	3400	300	.09	208	.06*
SBT	5	8500	2946	.42*	1840	.25
SBR	0	0	597		302	
EBL	2	3400	181	.05*	431	.13
EBT	3	5100	654	.15	1788	.41*
EBR	0	0	136		279	
WBL	2	3400	148	.04	271	.08*
WBT	3	5100	1490	.29*	898	.18
WBR	d	1700	198	.12	253	.15
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .94 .95

139 . Jamboree Rd. at McGaw Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	214	.06*	103	.03
NBT	4	6800	1628	.24	3146	.48*
NBR	0	0	31		87	
SBL	2	3400	22	.01	37	.01*
SBT	4	6800	2876	.42*	2098	.31
SBR	1	1700	307	.18	78	.05
EBL	1	1700	61	.04*	296	.17*
EBT	2	3400	46	.03	266	.13
EBR	0	0	43		188	
WBL	1	1700	61	.04	47	.03
WBT	2	3400	179	.06*	69	.03*
WBR	0	0	41		43	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .63 .74

140 . Jamboree Rd. at Kelvin Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	179	.11*	127	.07
NBT	4	6800	1702	.27	3299	.54*
NBR	0	0	104		357	
SBL	1	1700	8	.00	20	.01*
SBT	4	6800	3290	.48*	2517	.37
SBR	d	1700	28	.02	33	.02
EBL	1	1700	37	.02	34	.02
EBT	1	1700	8	.00*	24	.01*
EBR	d	1700	105	.06	150	.09
WBL	1	1700	265	.16*	147	.09*
WBT	1	1700	34	.04	20	.02
WBR	0	0	31		12	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .80 .70

141 . Jamboree Rd. at Main St.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	586	.17*	567	.17*
NBT	4	6800	1713	.25	2752	.40
NBR	f		228		461	
SBL	2	3400	521	.15	352	.10
SBT	4	6800	2707	.40*	2355	.35*
SBR	1	1700	559	.33	231	.14
EBL	2	3400	149	.04	494	.15
EBT	3	5100	340	.07*	1148	.23*
EBR	f		292		679	
WBL	2	3400	691	.20*	586	.17*
WBT	4	6800	605	.09	422	.06
WBR	f		98		354	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .89 .97

143 . Jamboree Rd. at I-405 NB Ramps

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1745	.26	3540	.52*
NBR	f		491		900	
SBL	0	0	0		0	
SBT	4	6800	2093	.31*	2647	.39
SBR	f		1712		1140	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	3	5100	1372	.27*	833	.16*
WBT	0	0	0		0	
WBR	f		938		220	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .63 .73

144 . Jamboree Rd. at I-405 SB Ramps

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1691	.25	3016	.44
NBR	f		654		1070	
SBL	0	0	0		0	
SBT	4	6800	3133	.46*	3062	.45*
SBR	f		301		640	
EBL	1.5		624	{.34}*	1324	.39*
EBT	0	6800	0	.34	0	
EBR	2.5		1716		948	.28
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .85 .89

145 . Jamboree Rd. at Michelson Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	175	.10*	102	.06
NBT	4	6800	1425	.21	2412	.35*
NBR	f		312		724	
SBL	2	3400	795	.23	1133	.33*
SBT	4	6800	2607	.38*	2039	.30
SBR	f		450		511	
EBL	2	3400	360	.11	1001	.29*
EBT	2	3400	493	.15*	463	.14
EBR	1	1700	139	.08	206	.12
WBL	2	3400	504	.15*	496	.15
WBT	2	3400	555	.16	497	.15*
WBR	f		595		878	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .83 1.17

146 . Jamboree Rd. at Dupont Rd.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	263	.15*	146	.09*
NBT	4	6800	1621	.24	2532	.37
NBR	1	1700	23	.01	43	.03
SBL	1	1700	83	.05	223	.13
SBT	3	5100	2356	.46*	2243	.44*
SBR	d	1700	456	.27	272	.16
EBL	2	3400	94	.03	364	.11
EBT	1	1700	34	.06*	84	.25*
EBR	0	0	71		343	
WBL	1	1700	42	.02*	64	.04*
WBT	2	3400	62	.04	52	.03
WBR	0	0	135	.08	94	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .74 .87

164 . Construction S. at Barranca Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	27	.02*	312	.18
NBT	1	1700	26	.03	22	.18*
NBR	0	0	17		287	
SBL	1	1700	58	.03	74	.04*
SBT	1	1700	64	.04*	45	.03
SBR	1	1700	135	.08	200	.12
EBL	1	1700	282	.17	175	.10*
EBT	3	5100	996	.20*	1449	.28
EBR	1	1700	79	.05	21	.01
WBL	1	1700	247	.15*	83	.05
WBT	3	5100	887	.17	1467	.29*
WBR	d	1700	81	.05	53	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .46 .66

168 . Murphy Av. at Alton Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	45	.03	86	.05
NBT	1	1700	17	.07*	115	.25*
NBR	0	0	99		318	
SBL	1	1700	33	.02*	101	.06*
SBT	1	1700	23	.04	45	.12
SBR	0	0	44		154	
EBL	1	1700	144	.08*	70	.04
EBT	3	5100	977	.19	1927	.38*
EBR	d	1700	58	.03	47	.03
WBL	1	1700	99	.06	107	.06*
WBT	3	5100	1720	.34*	1174	.23
WBR	d	1700	89	.05	25	.01
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .56 .80

170 . Union at Main St.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	137	.04*	686	.20*
NBT	1	1700	3	.01	8	.04
NBR	0	0	10		65	
SBL	1	1700	12	.01	38	.02
SBT	1	1700	3	.00*	2	.00*
SBR	1	1700	35	.02	51	.03
EBL	2	3400	111	.03*	118	.03
EBT	3	5100	530	.10	1748	.34*
EBR	f		428		138	
WBL	2	3400	71	.02	40	.01*
WBT	3	5100	1294	.25*	623	.12
WBR	1	1700	6	.00	24	.01
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.37		.60

171 . Veneto at Main St.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	234	.07*	157	.05
NBT	1	1700	6	.02	24	.12*
NBR	0	0	28		179	
SBL	1	1700	48	.03	29	.02*
SBT	1	1700	12	.05*	8	.02
SBR	0	0	70		23	
EBL	1	1700	25	.01*	97	.06
EBT	3	5100	339	.07	1592	.31*
EBR	1	1700	59	.03	93	.05
WBL	2	3400	80	.02	50	.01*
WBT	3	5100	959	.19*	420	.08
WBR	1	1700	19	.01	40	.02
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.37		.51

174 . Carlson Av. at Michelson Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	462	.14*	131	.04*
NBT	2	3400	196	.06	110	.03
NBR	1	1700	242	.14	430	.25
SBL	2	3400	57	.02	186	.05
SBT	1	1700	42	.02*	202	.12*
SBR	f		290		695	
EBL	2	3400	690	.20*	630	.19
EBT	2	3400	844	.25	1234	.36*
EBR	1	1700	89	.05	458	.27
WBL	1	1700	270	.16	380	.22*
WBT	2	3400	952	.28*	1035	.30
WBR	f		146		210	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.69		.79

175 . Carlson Av. at Campus Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	263	.15*	354	.21*
SBT	0	0	2		0	
SBR	1	1700	367	.22	257	.15
EBL	1	1700	204	.12*	380	.22*
EBT	2	3400	1101	.32	1541	.45
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	1398	.41*	1287	.38*
WBR	d	1700	198	.12	262	.15
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.73		.86

180 . Harvard Av. at Walnut Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	310	.09*	367	.11*
NBT	1	1700	68	.04	69	.04
NBR	d	1700	152	.09	218	.13
SBL	1	1700	191	.11	122	.07
SBT	1	1700	118	.07*	52	.03*
SBR	1	1700	151	.09	67	.04
EBL	1	1700	41	.02*	127	.07
EBT	2	3400	557	.16	841	.25*
EBR	1	1700	322	.19	339	.20
WBL	1	1700	130	.08	188	.11*
WBT	2	3400	1059	.31*	805	.24
WBR	d	1700	111	.07	44	.03
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.54		.55

181 . Harvard Av. at Edinger Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	257	.08	256	.08
NBT	2	3400	222	.07*	492	.14*
NBR	1	1700	151	.09	295	.17
SBL	1	1700	277	.16*	144	.08*
SBT	2	3400	365	.11	245	.07
SBR	d	1700	139	.08	92	.05
EBL	2	3400	91	.03*	171	.05*
EBT	3	5100	1162	.23	1251	.25
EBR	1	1700	204	.12	112	.07
WBL	2	3400	291	.09	114	.03
WBT	3	5100	1504	.32*	1452	.32*
WBR	0	0	118		167	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.63		.64

182 . Harvard Av. at Paseo Westpark

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	127	.07*	0	.00
NBT	2	3400	302	.09	918	.27*
NBR	d	1700	43	.03	123	.07
SBL	1	1700	43	.03	32	.02*
SBT	2	3400	729	.21*	423	.12
SBR	1	1700	153	.09	104	.06
EBL	1	1700	67	.04	88	.05
EBT	1	1700	104	.06*	175	.10*
EBR	d	1700	0	.00	0	.00
WBL	1	1700	201	.12*	77	.05*
WBT	1	1700	0	.00	106	.06
WBR	d	1700	281	.17	114	.07
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.51		.49

183 . Harvard Av. at Warner Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	113	.07*	259	.15
NBT	2	3400	236	.07	981	.29*
NBR	d	1700	71	.04	138	.08
SBL	1	1700	149	.09	76	.04*
SBT	2	3400	843	.25*	403	.12
SBR	d	1700	178	.10	85	.05
EBL	1	1700	171	.10*	248	.15*
EBT	2	3400	411	.12	656	.19
EBR	d	1700	139	.08	120	.07
WBL	1	1700	108	.06	77	.05
WBT	2	3400	659	.19*	597	.18*
WBR	d	1700	93	.05	111	.07
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.66		.71

184 . Harvard Av. at Barranca Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	128	.08*	301	.18
NBT	2	3400	325	.10	1057	.31*
NBR	1	1700	68	.04	124	.07
SBL	1	1700	182	.11	109	.06*
SBT	2	3400	740	.22*	407	.12
SBR	1	1700	197	.12	73	.04
EBL	2	3400	66	.02*	185	.05
EBT	3	5100	570	.11	1217	.24*
EBR	1	1700	174	.10	245	.14
WBL	2	3400	205	.06	118	.03*
WBT	3	5100	1095	.23*	916	.21
WBR	0	0	99		148	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .69

185 . Harvard Av. at Alton Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	458	.13*	270	.08
NBT	2	3400	337	.10	1165	.34*
NBR	d	1700	105	.06	166	.10
SBL	1	1700	33	.02	73	.04*
SBT	2	3400	844	.25*	502	.15
SBR	1	1700	323	.19	168	.10
EBL	2	3400	146	.04*	404	.12
EBT	3	5100	602	.12	1360	.27*
EBR	1	1700	309	.18	403	.24
WBL	2	3400	199	.06	165	.05*
WBT	3	5100	1194	.24*	772	.16
WBR	0	0	28		51	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .71 .75

186 . Harvard Av. at Main St.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	99	.03*	130	.04
NBT	2	3400	417	.12	1174	.35*
NBR	1	1700	77	.05	316	.19
SBL	2	3400	70	.02	37	.01*
SBT	2	3400	1064	.31*	776	.23
SBR	f		493		167	
EBL	2	3400	172	.05*	704	.21
EBT	3	5100	213	.04	1300	.25*
EBR	1	1700	87	.05	275	.16
WBL	2	3400	369	.11	141	.04*
WBT	3	5100	669	.14*	213	.05
WBR	0	0	40		25	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .70

187 . Harvard Av. at Coronado

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	174	.05*	209	.06
NBT	2	3400	480	.14	1430	.43*
NBR	0	0	9		39	
SBL	1	1700	30	.02	70	.04*
SBT	2	3400	1314	.39*	980	.29
SBR	d	1700	177	.10	71	.04
EBL	2	3400	49	.01*	98	.03
EBT	1	1700	1	.00	61	.04*
EBR	d	1700	153	.09	262	.15
WBL	1	1700	33	.02	17	.01*
WBT	1	1700	9	.01*	11	.01
WBR	1	1700	91	.05	52	.03
Right Turn Adjustment			EBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .56 .57

188 . Harvard Av. at Michelson Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	130	.08*	109	.06
NBT	2	3400	314	.10	1029	.34*
NBR	0	0	36		122	
SBL	1	1700	159	.09	325	.19*
SBT	2	3400	853	.25*	644	.19
SBR	f		448		302	
EBL	2	3400	142	.04*	408	.12
EBT	2	3400	345	.10	943	.28*
EBR	f		83		148	
WBL	1	1700	154	.09	108	.06*
WBT	2	3400	722	.25*	490	.20
WBR	0	0	144		183	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .92

189 . Harvard Av. at University Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	111	.07*	109	.06
NBT	2	3400	304	.09	708	.21*
NBR	d	1700	86	.05	302	.18
SBL	1	1700	20	.01	77	.05*
SBT	2	3400	628	.18*	588	.17
SBR	d	1700	401	.24	282	.17
EBL	1	1700	126	.07*	534	.31*
EBT	3	5100	765	.16	1991	.41
EBR	0	0	74		100	
WBL	1	1700	219	.13	182	.11
WBT	3	5100	2314	.47*	1070	.22*
WBR	0	0	82		38	
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .85 .84

190 . University Dr. at Campus Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	229	.07*	358	.11
NBT	3	5100	653	.13	1619	.32*
NBR	1	1700	494	.29	431	.25
SBL	2	3400	124	.04	103	.03*
SBT	3	5100	2013	.39*	1115	.22
SBR	1	1700	391	.23	164	.10
EBL	2	3400	355	.10*	558	.16*
EBT	2	3400	913	.27	978	.29
EBR	d	1700	38	.02	172	.10
WBL	2	3400	40	.01	275	.08
WBT	2	3400	760	.22*	1081	.32*
WBR	d	1700	202	.12	126	.07
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .83 .88

191 . Mesa Rd. at University Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	54	.03*	333	.20*
NBT	0	0	0		0	
NBR	1	1700	95	.06	280	.16
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1315	.26*	2276	.45*
EBR	1	1700	258	.15	118	.07
WBL	1	1700	252	.15*	192	.11*
WBT	3	5100	2006	.39	1341	.26
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .49 .81

192 . California Av. at University Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	227	.07*	756	.22*
NBT	0	0	0		0	
NBR	1	1700	234	.14	904	.53
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1436	.28*	1456	.29*
EBR	1	1700	883	.52	415	.24
WBL	2	3400	837	.25*	235	.07*
WBT	3	5100	1263	.25	1484	.29
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.19*	NBR	.26*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .84 .89

193 . MacArthur Blvd. NB at University Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	34	.02*	13	.01*
NBT	0	0	0		0	
NBR	1	1700	322	.19	324	.19
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1998	.39*	1516	.30*
EBR	d	1700	153	.09	113	.07
WBL	2	3400	587	.17*	1257	.37*
WBT	3	5100	896	.18	947	.19
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .73

196 . Hearthstone Bl. at ICD

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	27	.02*	33	.02*
NBT	2	3400	42	.01	54	.02
NBR	d	1700	411	.24	318	.19
SBL	1	1700	42	.02	28	.02
SBT	1	1700	43	.03*	37	.02*
SBR	d	1700	24	.01	26	.02
EBL	1	1700	33	.02	79	.05
EBT	3	5100	1517	.32*	1634	.34*
EBR	0	0	106		81	
WBL	1	1700	261	.15*	402	.24*
WBT	3	5100	1739	.34	1871	.37
WBR	0	0	15		37	
Right Turn Adjustment			NBR	.10*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .67

198 . Paseo Westpark at Warner Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	100	.06*	138	.08
NBT	1	1700	88	.05	272	.16*
NBR	d	1700	42	.02	51	.03
SBL	1	1700	74	.04	63	.04*
SBT	1	1700	322	.19*	105	.06
SBR	d	1700	74	.04	61	.04
EBL	1	1700	146	.09*	116	.07*
EBT	2	3400	474	.14	586	.17
EBR	d	1700	80	.05	135	.08
WBL	1	1700	88	.05	59	.03
WBT	2	3400	636	.19*	581	.17*
WBR	d	1700	156	.09	92	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .49

199 . Paseo Westpark at Barranca Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	73	.02*	162	.05
NBT	1	1700	105	.06	324	.19*
NBR	1	1700	163	.10	215	.13
SBL	2	3400	134	.04	95	.03*
SBT	1	1700	240	.14*	153	.09
SBR	d	1700	77	.05	72	.04
EBL	1	1700	35	.02*	115	.07
EBT	3	5100	747	.15	1310	.26*
EBR	1	1700	86	.05	164	.10
WBL	1	1700	221	.13	142	.08*
WBT	3	5100	1449	.30*	1027	.23
WBR	0	0	72		161	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .61

200 . Paseo Westpark at Alton Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	91	.05	109	.06
NBT	1	1700	124	.14*	282	.23*
NBR	0	0	115		109	
SBL	1	1700	195	.11*	87	.05*
SBT	1	1700	124	.07	113	.07
SBR	1	1700	231	.14	150	.09
EBL	1	1700	34	.02*	91	.05
EBT	3	5100	780	.18	994	.21*
EBR	0	0	139		65	
WBL	1	1700	127	.07	132	.08*
WBT	3	5100	1328	.26*	861	.17
WBR	d	1700	132	.08	157	.09
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .58 .62

201 . Paseo Westpark at Main St.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	184	.11	49	.03
NBT	1	1700	194	.19*	333	.23*
NBR	0	0	132		56	
SBL	1	1700	158	.09*	49	.03*
SBT	1	1700	242	.14	131	.08
SBR	1	1700	149	.09	84	.05
EBL	1	1700	16	.01*	65	.04
EBT	2	3400	340	.10	705	.21*
EBR	d	1700	143	.08	112	.07
WBL	1	1700	85	.05	27	.02*
WBT	2	3400	927	.27*	288	.08
WBR	d	1700	129	.08	72	.04
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .54

221 . Culver Dr. at Bryan Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	388	.11*	685	.20*
NBT	3	5100	667	.13	1577	.31
NBR	1	1700	235	.14	529	.31
SBL	2	3400	140	.04	156	.05
SBT	3	5100	2175	.43*	891	.17*
SBR	d	1700	355	.21	152	.09
EBL	2	3400	141	.04*	257	.08*
EBT	1.5	5100	266	{.13}	474	{.14}
EBR	1.5		514		449	{.11}
WBL	2	3400	552	.16	271	.08
WBT	2	3400	696	.26*	663	.25*
WBR	0	0	182		176	
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .89 .75

222 . Culver Dr. at Trabuco Rd.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	587	.12*	1856	.36*
NBR	f		1062		1475	
SBL	1	1700	685	.40*	342	.20*
SBT	3	5100	2445	.48	1258	.25
SBR	f		711		180	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	643	.19*	539	.16*
WBT	0	0	0		0	
WBR	2	3400	789	.23	890	.26
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .77

223 . Culver Dr. at I-5 SB Ramps

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1258	.25	2032	.40*
NBR	f		243		300	
SBL	0	0	0		0	
SBT	3	5100	2199	.43*	1499	.29
SBR	f		325		250	
EBL	3	5100	527	.10*	1008	.20*
EBT	0	0	0		0	
EBR	2	3400	398	.12	921	.27
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.02*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .65

224 . Culver Dr. at Walnut Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	172	.05*	359	.11
NBT	3	5100	786	.15	1641	.32*
NBR	1	1700	297	.17	370	.22
SBL	2	3400	273	.08	397	.12*
SBT	3	5100	1902	.37*	1465	.29
SBR	1	1700	472	.28	288	.17
EBL	2	3400	391	.12*	588	.17*
EBT	2	3400	670	.20	543	.16
EBR	1	1700	253	.15	139	.08
WBL	2	3400	445	.13	406	.12
WBT	2	3400	756	.22*	733	.22*
WBR	1	1700	293	.17	261	.15
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .81 .88

225 . Culver Dr. at Deerfield Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	46	.01*	117	.03
NBT	3	5100	991	.19	1833	.36*
NBR	1	1700	107	.06	134	.08
SBL	2	3400	152	.04	149	.04*
SBT	3	5100	2143	.42*	1557	.31
SBR	1	1700	253	.15	319	.19
EBL	1	1700	191	.11*	453	.27*
EBT	1	1700	181	.11	168	.10
EBR	d	1700	127	.07	170	.10
WBL	1	1700	180	.11	83	.05
WBT	1	1700	182	.21*	94	.13*
WBR	0	0	178		124	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .80 .85

226 . Culver Dr. at ICD

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	339	.10*	369	.11*
NBT	4	6800	720	.11	1501	.22
NBR	f		222		390	
SBL	2	3400	218	.06	288	.08
SBT	4	6800	1834	.27*	1354	.20*
SBR	1	1700	327	.19	218	.13
EBL	2	3400	249	.07	320	.09*
EBT	3	5100	1190	.23*	1196	.23
EBR	f		282		203	
WBL	2	3400	404	.12*	265	.08
WBT	3	5100	1314	.26	1316	.26*
WBR	f		112		201	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .77 .71

227 . Culver Dr. at Warner Av.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	149	.09*	286	.17*
NBT	3	5100	1077	.21	1927	.38
NBR	1	1700	67	.04	205	.12
SBL	1	1700	79	.05	103	.06
SBT	3	5100	2275	.45*	1409	.28*
SBR	d	1700	205	.12	289	.17
EBL	2	3400	283	.08*	245	.07
EBT	2	3400	245	.07	271	.08*
EBR	d	1700	260	.15	214	.13
WBL	1	1700	219	.13	127	.07*
WBT	2	3400	398	.12*	225	.07
WBR	d	1700	153	.09	149	.09
Right Turn Adjustment			EBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .80 .65

228 . Culver Dr. at Barranca Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	139	.04*	269	.08
NBT	3	5100	726	.14	1711	.34*
NBR	1	1700	363	.21	370	.22
SBL	2	3400	363	.11	300	.09*
SBT	3	5100	2073	.41*	1203	.24
SBR	f		305		227	
EBL	2	3400	473	.14	365	.11*
EBT	2	3400	944	.28*	749	.22
EBR	1	1700	212	.12	475	.28
WBL	2	3400	385	.11*	272	.08
WBT	3	5100	845	.20	764	.22*
WBR	0	0	150		354	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .89 .81

229 . Culver Dr. at Alton Pkwy.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	135	.04*	292	.09
NBT	3	5100	956	.19	2025	.40*
NBR	1	1700	292	.17	357	.21
SBL	2	3400	163	.05	206	.06*
SBT	3	5100	2085	.41*	1174	.23
SBR	f		299		242	
EBL	2	3400	148	.04*	309	.09
EBT	2	3400	695	.20	907	.27*
EBR	1	1700	209	.12	306	.18
WBL	2	3400	447	.13	350	.10*
WBT	2	3400	1006	.30*	786	.23
WBR	1	1700	196	.12	247	.15
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .84 .88

230 . Culver Dr. at Main St.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	131	.04*	121	.04
NBT	3	5100	1111	.22	2069	.41*
NBR	1	1700	145	.09	469	.28
SBL	2	3400	64	.02	210	.06*
SBT	3	5100	2167	.42*	1566	.31
SBR	f		512		165	
EBL	2	3400	186	.05	571	.17*
EBT	2	3400	124	.04*	421	.12
EBR	f		104		149	
WBL	2	3400	520	.15*	155	.05
WBT	2	3400	324	.10	84	.02*
WBR	1	1700	123	.07	80	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .70 .71

231 . Culver Dr. at Paseo Westpark

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	185	.11*	236	.14*
NBT	3	5100	1291	.25	2536	.50
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2658	.52*	1823	.36*
SBR	d	1700	145	.09	74	.04
EBL	1	1700	79	.05*	54	.03*
EBT	0	0	0		0	
EBR	1	1700	312	.18	67	.04
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			EBR	.05*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .78 .58

232 . Culver Dr. at I-405 NB Ramps

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	808	.16	1978	.39*
NBR	f		560		400	
SBL	0	0	0		0	
SBT	3	5100	1282	.25*	1247	.24
SBR	f		930		660	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	848	.25*	493	.15*
WBT	0	0	0		0	
WBR	1	1700	522	.31	822	.48
Right Turn Adjustment					WBR	.33*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .92

233 . Culver Dr. at I-405 SB Ramps

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1042	.20	1538	.30*
NBR	f		277		747	
SBL	0	0	0		0	
SBT	3	5100	1826	.36*	1300	.25
SBR	f		256		343	
EBL	1.5		290	{.16}*	874	{.26}*
EBT	0	5100	0	.16	0	{.26}
EBR	1.5		540		507	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .61

234 . Culver Dr. at Michelson Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	128	.04*	408	.12
NBT	3	5100	952	.19	1840	.38*
NBR	0	0	10		83	
SBL	2	3400	183	.05	557	.16*
SBT	3	5100	1792	.35*	887	.17
SBR	1	1700	324	.19	350	.21
EBL	2	3400	326	.10	312	.09
EBT	1	1700	163	.10*	180	.11*
EBR	1	1700	272	.16	221	.13
WBL	1	1700	85	.05*	182	.11*
WBT	2	3400	104	.03	172	.05
WBR	1	1700	200	.12	288	.17
Right Turn Adjustment			EBR	.03*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .81

235 . Culver Dr. at University Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	10	.01	70	.04
NBT	4	6800	1457	.21*	1717	.25*
NBR	2	3400	385	.11	938	.28
SBL	2	3400	29	.01*	31	.01*
SBT	4	6800	1331	.20	1172	.17
SBR	d	1700	374	.22	340	.20
EBL	2	3400	54	.02	411	.12
EBT	3	5100	646	.13*	1101	.22*
EBR	d	1700	18	.01	25	.01
WBL	2	3400	690	.20*	802	.24*
WBT	3	5100	1436	.29	759	.16
WBR	0	0	29		61	
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for NBR						

TOTAL CAPACITY UTILIZATION .60 .77

337 . Von Karman Ave. at Quartz

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	372	.22*	187	.11*
NBT	3	5100	1787	.35	2432	.48
NBR	1	1700	160	.09	49	.03
SBL	1	1700	287	.17	117	.07
SBT	2	3400	2104	.62*	1968	.58*
SBR	d	1700	419	.25	166	.10
EBL	2	3400	64	.02*	357	.11*
EBT	1	1700	4	.00	5	.00
EBR	1	1700	62	.04	366	.22
WBL	1	1700	28	.02	36	.02
WBT	1	1700	11	.01*	7	.00*
WBR	f		71		230	
Right Turn Adjustment					EBR	.05*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .92 .90

439 . Bixby at Michleson Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	16	.01*	31	.02*
NBT	1	1700	1	.00	2	.02
NBR	0	0	3		26	
SBL	2	3400	10	.00	90	.03
SBT	1	1700	3	.03*	3	.09*
SBR	0	0	48		157	
EBL	1	1700	146	.09*	81	.05*
EBT	2	3400	497	.16	774	.24
EBR	0	0	48		31	
WBL	1	1700	29	.02	66	.04
WBT	2	3400	586	.17*	891	.26*
WBR	1	1700	43	.03	27	.02
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .35 .47

440 . Siglo at Main St.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	136	.04*	287	.08*
SBT	0	0	0		0	
SBR	1	1700	163	.10	103	.06
EBL	2	3400	72	.02*	200	.06
EBT	3	5100	607	.12	2043	.40*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5100	1514	.30*	1107	.22
WBR	1	1700	219	.13	100	.06
Right Turn Adjustment			SBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .45 .53

441 . Loop Rd. at Jamboree Rd. SB Ramps

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	20	.01	130	.04
NBR	1	1700	20	.01	60	.04
SBL	1	1700	20	.01	21	.01
SBT	2	3400	210	.06*	158	.05*
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		550	.16*	278	.08*
WBT	0	5100	0		0	
WBR	1.5		50		83	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .27 .18

472 . Obsidian at Michleson Dr.

P2030 MPAH With Project (IRVINE ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	5		24	
NBT	1	1700	0	.02*	0	.03*
NBR	0	0	26		35	
SBL	0	0	13	{.01}*	116	{.07}*
SBT	1	1700	0	.01	0	.07
SBR	f		18		93	
EBL	1	1700	123	.07*	43	.03*
EBT	2	3400	771	.24	871	.26
EBR	0	0	38		12	
WBL	1	1700	32	.02	18	.01
WBT	2	3400	1426	.42*	1087	.32*
WBR	f		127		59	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .50

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\MPAHwProject\EXE-193\ICU\P30WP-MPAH-C-NPB01-110409

61 . Airport Wy. at Campus Dr.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	2	3200	347	.11	598	.19
EBL	1	1600	197	.12	260	.16*
EBT	3	4800	1390	.29*	1050	.22
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	663	.16	1452	.35*
WBR	0	0	103		250	
Right Turn Adjustment			SBR	.11*	SBR	.19*
TOTAL CAPACITY UTILIZATION				.40		.70

62 . Campus Dr. at Bristol St. NB

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	602	.19	759	.24*
NBT	3	4800	2109	.44*	732	.15
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6400	273	.04	1020	.16*
SBR	2	3200	447	.14	1089	.34
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	187	.12	350	.22
WBT	5	8000	1481	.23*	2402	.32*
WBR	0	0	421	.26	138	
Right Turn Adjustment			WBR	.03*	SBR	.18*
TOTAL CAPACITY UTILIZATION				.70		.90

63 . Campus Dr. at Bristol St. SB

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	5	8000	1369	.20*	844	.13*
NBR	0	0	224		217	.14
SBL	1	1600	176	.11*	302	.19*
SBT	3	4800	294	.06	1096	.23
SBR	0	0	0		0	
EBL	1.5		1351	{.50}*	556	{.25}*
EBT	2.5	6400	1840	.50	1021	.25
EBR	2	3200	456	.14	454	.14
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.01*
TOTAL CAPACITY UTILIZATION				.81		.58

64 . Birch St. at Bristol St. NB

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	220	.07	288	.09*
NBT	2	3200	1187	.37*	672	.21
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	1.5	6400	354	.11	826	.31*
SBR	2.5		257	.08	1164	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		646		764	
WBT	3.5	8000	1663	.34*	1588	.32*
WBR	0		383		198	
TOTAL CAPACITY UTILIZATION				.71		.72

65 . Birch St. at Bristol St. SB

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2.5	6400	526	.15*	637	.16
NBR	1.5		434		414	
SBL	2	3200	281	.09*	354	.11
SBT	2	3200	649	.20	1252	.39*
SBR	0	0	0		0	
EBL	1.5		664	{.25}*	283	
EBT	3	8000	985	.25	1092	.20*
EBR	0.5		341		188	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .49 .59

84 . MacArthur Bl. at Campus Dr.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	58	.02	121	.04
NBT	4	6400	1125	.18*	1167	.18*
NBR	1	1600	110	.07	103	.06
SBL	1	1600	343	.21*	266	.17*
SBT	3.5	8000	1172	.18	1306	.26
SBR	1.5		276	.17	748	
EBL	2	3200	465	.15*	350	.11*
EBT	3	4800	866	.18	721	.15
EBR	1	1600	103	.06	109	.07
WBL	2	3200	115	.04	145	.05
WBT	3	4800	516	.11*	1161	.24*
WBR	f		230		183	

TOTAL CAPACITY UTILIZATION .65 .70

85 . MacArthur Bl. at Birch St.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	49	.03	122	.08*
NBT	3	4800	1763	.37*	1253	.26
NBR	f		102		45	
SBL	1	1600	183	.11*	165	.10
SBT	4	6400	868	.17	2255	.39*
SBR	0	0	237		212	
EBL	1.5		187	.12*	350	{.18}*
EBT	1.5	4800	545	.19	480	.18
EBR	0		78		25	
WBL	1	1600	54	.03	129	.08
WBT	2	3200	505	.16*	996	.31*
WBR	f		141		197	

TOTAL CAPACITY UTILIZATION .76 .96

105 . Von Karman Av. at Campus Dr.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	11	.01	68	.04*
NBT	2	3200	837	.26*	766	.24
NBR	f		92		161	
SBL	1	1600	226	.14*	284	.18
SBT	2	3200	756	.29	1058	.43*
SBR	0	0	185		313	
EBL	2	3200	321	.10*	344	.11*
EBT	2	3200	681	.22	657	.22
EBR	0	0	25		54	
WBL	1	1600	99	.06	130	.08
WBT	2	3200	474	.22*	942	.34*
WBR	0	0	222		153	

TOTAL CAPACITY UTILIZATION .72 .92

106 . Von Karman Av. at Birch St.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	42	.03	102	.06*
NBT	2	3200	667	.23*	635	.25
NBR	0	0	76		164	
SBL	1	1600	78	.05*	57	.04
SBT	2	3200	491	.24	706	.29*
SBR	0	0	264		225	
EBL	1	1600	117	.07*	198	.12*
EBT	2	3200	296	.12	488	.17
EBR	0	0	76		55	
WBL	1	1600	153	.10	49	.03
WBT	2	3200	495	.17*	603	.22*
WBR	0	0	36		97	

TOTAL CAPACITY UTILIZATION .52 .69

107 . Von Karman Av. at MacArthur Bl.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	39	.02*	140	.09
NBT	2	3200	137	.04	290	.09*
NBR	f		43		182	
SBL	2	3200	210	.07	722	.23*
SBT	1	1600	234	.15*	126	.08
SBR	f		37		64	
EBL	1	1600	71	.04*	76	.05
EBT	3	4800	497	.10	996	.21*
EBR	f		164		70	
WBL	1	1600	82	.05	55	.03*
WBT	3	4800	893	.19*	686	.14
WBR	f		732		214	

TOTAL CAPACITY UTILIZATION .40 .56

121 . Teller Av. at Campus Dr.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	6	.00	41	.03*
NBT	1	1600	49	.03	105	.07
NBR	1	1600	34	.02	63	.04
SBL	1	1600	51	.03	148	.09
SBT	1	1600	122	.14*	109	.18*
SBR	0	0	95		173	
EBL	1	1600	136	.09*	73	.05
EBT	2	3200	848	.26	977	.31*
EBR	f		44		23	
WBL	1	1600	54	.03	59	.04*
WBT	2	3200	621	.26*	702	.26
WBR	0	0	217		114	

TOTAL CAPACITY UTILIZATION .49 .56

147 . Jamboree Rd. at Campus Dr.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	199	.06	129	.04
NBT	4	6400	1498	.23*	2018	.32*
NBR	1	1600	153	.10	574	.36
SBL	2	3200	503	.16*	400	.13*
SBT	4	6400	1818	.30	2035	.35
SBR	0	0	117		176	
EBL	2	3200	186	.06	368	.12*
EBT	2	3200	756	.24*	636	.20
EBR	f		67		319	
WBL	2	3200	779	.24*	346	.11
WBT	2	3200	505	.16	694	.22*
WBR	1	1600	218	.14	434	.27

Note: Assumes Right-Turn Overlap for WBR NBR

TOTAL CAPACITY UTILIZATION .87 .79

148 . Jamboree Rd. at Birch St.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	163	.10*	206	.13*
NBT	3	4800	1723	.36	2031	.42
NBR	0	0	1		1	
SBL	1	1600	5	.00	1	.00
SBT	4	6400	2157	.34*	2307	.36*
SBR	f		507		334	
EBL	1.5		157	{.05}*	539	{.17}*
EBT	0.5	3200	2	.05	0	.17
EBR	f		33		183	
WBL	0	0	0		0	
WBT	1	1600	0	.00*	0	.00*
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .49 .66

149 . Jamboree Rd. at Fairchild Rd.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	10	.01	62	.04
NBT	3	4800	1984	.42*	1939	.41*
NBR	0	0	53		41	
SBL	2	3200	327	.10*	338	.11*
SBT	4	6400	1954	.31	2207	.34
SBR	d	1600	8	.01	7	.00
EBL	1	1600	46	.03	137	.09
EBT	1	1600	0	.04*	80	.25*
EBR	0	0	65		320	
WBL	1	1600	11	.01*	33	.02*
WBT	1	1600	3	.00	41	.03
WBR	1	1600	390	.24	334	.21
Right Turn Adjustment			WBR	.22*	WBR	.03*

TOTAL CAPACITY UTILIZATION .79 .82

150 . Jamboree Rd. at MacArthur Bl.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	440	.14*	228	.07*
NBT	4	6400	1137	.18	1161	.18
NBR	1	1600	235	.15	38	.02
SBL	3	4800	605	.13	679	.14
SBT	3	4800	996	.21*	1554	.32*
SBR	1	1600	286	.18	175	.11
EBL	2	3200	195	.06*	294	.09
EBT	3	4800	630	.13	1273	.27*
EBR	f		154		322	
WBL	2	3200	140	.04	294	.09*
WBT	3	4800	1634	.34*	757	.16
WBR	1	1600	718	.45	535	.33
Right Turn Adjustment			WBR	.11*	WBR	.06*

TOTAL CAPACITY UTILIZATION .86 .81

151 . Jamboree Rd. at Bristol St. NB-SR73 NB Ramps

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	777	.24*	602	.19*
NBT	3	4800	1650	.34	2207	.46
NBR	f		0		0	
SBL	0	0	0		0	
SBT	2.5	6400	560	.16*	1260	.35*
SBR	1.5		453		991	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .40 .54

153 . Jamboree Rd. at Bristol St. SB

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	6	9600	1505	.16*	1627	.18
NBR	0	0	38		75	
SBL	0	0	0		0	
SBT	4	6400	618	.10	1191	.19*
SBR	0	0	0		0	
EBL	2.5		1478	.31*	1283	{.35}*
EBT	1.5	6400	470	.29	985	.35
EBR	2	3200	742	.23	869	.27
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .47 .54

154 . Jamboree Rd. at Eastbluff Dr.-University Dr.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	38	.02	29	.02*
NBT	3	4800	1296	.27*	1376	.29
NBR	1	1600	215	.13	254	.16
SBL	2	3200	152	.05*	238	.07
SBT	3	4800	1135	.24	1713	.36*
SBR	1	1600	362	.23	508	.32
EBL	1.5		452	{.20}*	277	{.13}*
EBT	0.5	3200	157	.20	128	.13
EBR	0		17		20	
WBL	1.5		293		270	
WBT	1.5	4800	207	.10*	213	.10*
WBR	f		366		196	

TOTAL CAPACITY UTILIZATION .62 .61

155 . Jamboree Rd. at Bison Av.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	4800	1190	.25*	1553	.32
NBR	d	1600	274	.17	152	.10
SBL	2	3200	206	.06*	168	.05
SBT	3	4800	1345	.28	1771	.37*
SBR	1	1600	210	.13	120	.08
EBL	1	1600	109	.07*	64	.04
EBT	0	0	0		0	
EBR	1	1600	82	.05	38	.02
WBL	2	3200	163	.05	421	.13*
WBT	0	0	0		0	
WBR	2	3200	161	.05	263	.08
Right Turn Adjustment			Multi	.08*	EBR	.02*

TOTAL CAPACITY UTILIZATION .46 .52

156 . Jamboree Rd. at Ford Rd.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	323	.10*	323	.10*
NBT	3	4800	1249	.28	1742	.40
NBR	0	0	77		154	
SBL	1	1600	77	.05	57	.04
SBT	3	4800	1444	.30*	2095	.44*
SBR	1	1600	239	.15	76	.05
EBL	1.5		299	{.11}*	102	.06
EBT	1.5	4800	251	.11	249	.08*
EBR	1	1600	211	.13	227	.14
WBL	1.5		93	.06	139	{.07}*
WBT	1.5	4800	388	.12*	191	.07
WBR	1	1600	38	.02	47	.03
Right Turn Adjustment					EBR	.06*

TOTAL CAPACITY UTILIZATION .63 .75

176 . Fairchild Av. at MacArthur Bl.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	50	.03*	574	.36*
SBT	0	0	0		0	
SBR	1	1600	21	.01	190	.12
EBL	1	1600	314	.20*	52	.03
EBT	3	4800	1210	.25	2016	.42*
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	2509	.66*	1450	.34
WBR	0	0	656		198	

TOTAL CAPACITY UTILIZATION .89 .78

178 . MacArthur Bl. at Bison Av.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	252	.08	245	.08*
NBT	4	6400	2472	.39*	2483	.39
NBR	1	1600	187	.12	185	.12
SBL	2	3200	90	.03*	230	.07
SBT	4	6400	2048	.32	2778	.43*
SBR	1	1600	328	.21	417	.26
EBL	2	3200	256	.08	216	.07
EBT	2	3200	302	.09*	215	.07*
EBR	f		192		240	
WBL	2	3200	389	.12*	462	.14*
WBT	2	3200	271	.08	429	.13
WBR	1	1600	92	.06	180	.11

TOTAL CAPACITY UTILIZATION .63 .72

179 . MacArthur Bl. at Ford Rd.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	102	.03	57	.02
NBT	4	6400	1932	.30*	2395	.37*
NBR	f		79		442	
SBL	3	4800	562	.12*	814	.17*
SBT	4	6400	1951	.30	2369	.37
SBR	f		14		51	
EBL	2	3200	42	.01	29	.01
EBT	2	3200	270	.08*	301	.09*
EBR	1	1600	117	.07	59	.04
WBL	2	3200	536	.17*	226	.07*
WBT	2	3200	325	.10	282	.09
WBR	f		960		522	

TOTAL CAPACITY UTILIZATION .67 .70

194 . MacArthur Blvd. SB at University Dr.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	72	.05*	128	.08*
NBT	0	0	0		0	
NBR	1	1600	617	.39	524	.33
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	4800	1543	.34*	1246	.26*
EBR	0	0	70		22	
WBL	2	3200	100	.03*	338	.11*
WBT	3	4800	1008	.21	882	.18
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.34*	NBR	.25*

TOTAL CAPACITY UTILIZATION .76 .70

195 . SR-73 SB Ramps at University Dr.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1600	1010	.63*	701	.44*
SBT	0	0	0		0	
SBR	1	1600	65	.04	219	.14
EBL	0	0	0		0	
EBT	3	4800	590	.12	639	.13
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	4800	685	.14*	731	.15*
WBR	0	0	0		0	
TOTAL CAPACITY UTILIZATION				.77		.59

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\MPAHwProject\EXE-193\ICU\P30WP-MPAH-C-NPB02-110409

733 . Irvine Av. at Mesa Dr.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	116	.07	46	.03*
NBT	3	4800	1035	.22*	646	.13
NBR	d	1600	379	.24	313	.20
SBL	1	1600	31	.02*	29	.02
SBT	3	4800	498	.10	1518	.32*
SBR	d	1600	93	.06	221	.14
EBL	1	1600	138	.09	45	.03*
EBT	1	1600	290	.18*	217	.14
EBR	1	1600	47	.03	140	.09
WBL	2	3200	275	.09*	552	.17
WBT	1	1600	112	.07	543	.34*
WBR	1	1600	28	.02	39	.02
Right Turn Adjustment			NBR	.02*		

TOTAL CAPACITY UTILIZATION .53 .72

734 . Irvine Av. at University Dr.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	157	.10	178	.11*
NBT	3	4800	1233	.26*	649	.14
NBR	1	1600	1	.00	11	.01
SBL	1	1600	107	.07*	51	.03
SBT	3	4800	552	.12	1607	.33*
SBR	1	1600	175	.11	492	.31
EBL	1.5		365	{.13}*	285	{.11}*
EBT	0.5	3200	52	.13	60	.11
EBR	1	1600	117	.07	198	.12
WBL	1	1600	11	.01	26	.02
WBT	1	1600	29	.02*	68	.04*
WBR	d	1600	31	.02	47	.03

TOTAL CAPACITY UTILIZATION .48 .59

741 . Jamboree Av. at San Joaquin Hills Rd.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	50	.03	78	.05
NBT	3	4800	1134	.24*	1602	.33*
NBR	f		129		142	
SBL	2	3200	666	.21*	463	.14*
SBT	3	4800	1224	.26	1853	.39
SBR	f		45		136	
EBL	1.5		265	.08*	161	.05*
EBT	1.5	4800	34	.02	35	.02
EBR	f		61		57	
WBL	2	3200	125	.04	191	.06
WBT	1	1600	14	.01*	46	.03*
WBR	1	1600	41	.03	67	.04
Right Turn Adjustment			WBR	.02*	WBR	.01*

TOTAL CAPACITY UTILIZATION .56 .56

742 . MacArthur Blvd. at San Joaquin Hills Rd.

P2030 MPAH With Project (NEWPORT BEACH ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	139	.04*	110	.03*
NBT	4	6400	1307	.24	1884	.30
NBR	0	0	203		30	
SBL	3	4800	272	.06	550	.11
SBT	3	4800	1782	.37*	1877	.39*
SBR	f		479		235	
EBL	3	4800	448	.09*	522	.11*
EBT	3	4800	112	.03	380	.11
EBR	0	0	41		161	
WBL	1	1600	11	.01	53	.03
WBT	2	3200	385	.12*	325	.10*
WBR	f		474		564	

TOTAL CAPACITY UTILIZATION .62 .63

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\MPAHwProject\EXE-193\ICU\P30WP-MPAH-C-SAN01-110409

4 . SR-55 SB Ramps at Edinger Av.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		427		347	{.11}*
NBT	0.5	3400	43	.14*	43	.11
NBR	2	3400	440	.13	180	.05
SBL	1	1700	80	.05*	143	.08
SBT	1	1700	24	.04	81	.09*
SBR	0	0	36		66	
EBL	1	1700	50	.03	63	.04
EBT	3	5100	1830	.36*	1723	.34*
EBR	f		285		324	
WBL	2	3400	401	.12*	422	.12*
WBT	3	5100	1727	.36	1513	.32
WBR	0	0	97		96	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .72 .71

5 . Hotel Terrace Dr. at Dyer Rd.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		186	{.06}*	171	{.05}*
NBT	0.5	3400	14	.06	14	.05
NBR	2	3400	360	.11	95	.03
SBL	0.5		102		107	
SBT	1.5	3400	198	.09*	490	.18*
SBR	1	1700	40	.02	142	.08
EBL	1	1700	66	.04	123	.07
EBT	3	5100	1029	.20*	840	.16*
EBR	1	1700	346	.20	127	.07
WBL	2	3400	456	.13*	586	.17*
WBT	3	5100	714	.14	880	.17
WBR	1	1700	180	.11	53	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .61

6 . Grand Av. at Dyer Rd.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	585	.17*	714	.21*
SBT	0	0	0		0	
SBR	1	1700	368	.22	306	.18
EBL	2	3400	181	.05	326	.10*
EBT	3	5100	1315	.26*	814	.16
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	3	5100	992	.19	1302	.26*
WBR	f		769		448	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .48 .62

7 . SR-55 NB Ramps at Dyer Rd.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		813	{.29}*	232	.07*
NBT	0	5100	0	.29	0	
NBR	1.5		689		80	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	2131	.42*	1020	.20
EBR	f		550		1020	
WBL	0	0	0		0	
WBT	2.5	6800	987	{.19}	1618	{.41}*
WBR	1.5		390	{.01}	1280	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .76 .53

8 . SR-55 SB Ramps at MacArthur Blvd.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	2	3400	869	.26*	346	.10*
SBT	0	0	0		0	
SBR	2	3400	963	.28	720	.21
EBL	0	0	0		0	
EBT	2	3400	1271	.37*	1094	.32
EBR	f		720		1020	
WBL	0	0	0		0	
WBT	3	5100	1087	.21	1680	.33*
WBR	f		190		830	
Right Turn Adjustment					SBR	.11*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.68		.59

9 . SR-55 NB Ramps at MacArthur Blvd.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	956	.28*	685	.20*
NBT	0	0	0		0	
NBR	f		724		233	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	1324	.39*	778	.23
EBR	f		616		751	
WBL	0	0	0		0	
WBT	3	5100	568	.11	1759	.34*
WBR	f		283		1212	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.72		.59

28 . Pullman St. at Warner Av.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		74		175	
NBT	0.5	1700	21	.06*	12	.11*
NBR	1	1700	77	.05	113	.07
SBL	0	0	44	{.03}*	132	{.08}*
SBT	2	3400	21	.02	42	.06
SBR	0	0	15		157	.09
EBL	1	1700	84	.05	47	.03*
EBT	3	5100	1659	.36*	1286	.26
EBR	0	0	181		59	
WBL	1	1700	48	.03*	60	.04
WBT	3	5100	1081	.22	1748	.35*
WBR	0	0	64		31	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.53		.62

29 . Pullman St. at Barranca Pkwy.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	88	.03	550	.16*
NBT	1	1700	33	.05*	26	.10
NBR	0	0	54		151	
SBL	1	1700	68	.04*	62	.04
SBT	0.5	3400	28	{.02}	11	{.07}*
SBR	1.5		69		344	
EBL	1	1700	326	.19*	151	.09*
EBT	4	6800	1458	.27	941	.15
EBR	0	0	362		49	
WBL	1	1700	99	.06	81	.05
WBT	4	6800	1024	.16*	1898	.29*
WBR	0	0	60		57	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.49		.66

543 . Bristol St. at Segerstrom Av.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	96	.06*	224	.13
NBT	3	5100	798	.16	1325	.26*
NBR	d	1700	227	.13	378	.22
SBL	1	1700	252	.15	189	.11*
SBT	3	5100	1248	.27*	974	.21
SBR	0	0	123		114	
EBL	1	1700	256	.15	270	.16*
EBT	2	3400	1210	.38*	1043	.40
EBR	0	0	95		304	
WBL	1	1700	207	.12*	272	.16
WBT	2	3400	841	.28	1221	.40*
WBR	0	0	97		126	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.88		.98

544 . Bristol St. at MacArthur Blvd.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	104	.03*	456	.13*
NBT	3	5100	791	.16	1595	.31
NBR	1	1700	126	.07	329	.19
SBL	2	3400	254	.07	286	.08
SBT	3	5100	1422	.31*	1180	.27*
SBR	0	0	143		184	
EBL	2	3400	216	.06	363	.11*
EBT	3	5100	1170	.23*	723	.14
EBR	1	1700	154	.09	163	.10
WBL	2	3400	174	.05*	376	.11
WBT	3	5100	963	.19	1400	.27*
WBR	1	1700	154	.09	273	.16
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.67		.83

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\MPAHwProject\EXE-193\ICU\P30WP-MPAH-C-SAN02-110409

719 . Flower St. at Segerstrom Av.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	109	.06	131	.08*
NBT	2	3400	606	.21*	468	.19
NBR	0	0	114		173	
SBL	1	1700	148	.09*	180	.11
SBT	2	3400	460	.16	757	.25*
SBR	0	0	92		95	
EBL	1	1700	135	.08	140	.08*
EBT	2	3400	1341	.49*	928	.32
EBR	0	0	315		164	
WBL	1	1700	107	.06*	60	.04
WBT	2	3400	941	.30	1364	.43*
WBR	0	0	80		102	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .90 .89

720 . Flower St. at MacArthur Blvd.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	85	.05	29	.02
NBT	2	3400	467	.22*	585	.19*
NBR	0	0	288		72	
SBL	1	1700	202	.12*	106	.06*
SBT	2	3400	332	.18	339	.13
SBR	0	0	285		97	
EBL	1	1700	151	.09	186	.11*
EBT	3	5100	1309	.26*	1042	.22
EBR	0	0	33		78	
WBL	1	1700	42	.02*	133	.08
WBT	3	5100	699	.15	1914	.42*
WBR	0	0	56		239	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .83

723 . Main St. at Dyer Rd.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	111	.07*	245	.14
NBT	2	3400	683	.20	1409	.41*
NBR	1	1700	245	.14	432	.25
SBL	1	1700	211	.12	97	.06*
SBT	3	5100	1336	.30*	776	.19
SBR	0	0	204		208	
EBL	1	1700	286	.17	220	.13*
EBT	2	3400	1224	.36*	733	.22
EBR	1	1700	298	.18	125	.07
WBL	1	1700	196	.12*	219	.13
WBT	2	3400	915	.27	1119	.33*
WBR	1	1700	121	.07	163	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .90 .98

724 . Main St. at Alton Pkwy.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	12	.01	28	.02
NBT	3	5100	750	.16*	1706	.36*
NBR	0	0	83		117	
SBL	1	1700	467	.27*	337	.20*
SBT	3	5100	1311	.26	739	.15
SBR	0	0	7		29	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0.5		119		168	
WBT	0.5	1700	2	.07*	1	.10*
WBR	1	1700	340	.20	413	.24
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .71

725 . Main St. at MacArthur Blvd.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	49	.01	355	.10
NBT	3	5100	287	.06*	676	.13*
NBR	1	1700	208	.12	365	.21
SBL	2	3400	404	.12*	214	.06*
SBT	3	5100	609	.12	415	.08
SBR	1	1700	146	.09	311	.18
EBL	2	3400	272	.08	322	.09*
EBT	3	5100	1588	.31*	670	.13
EBR	1	1700	166	.10	59	.03
WBL	2	3400	285	.08*	216	.06
WBT	3	5100	745	.15	1344	.26*
WBR	1	1700	270	.16	412	.24
Right Turn Adjustment					SBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.62		.61

727 . Halladay St. at Dyer Rd.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	77	.05	126	.07
NBT	1	1700	138	.25*	178	.22*
NBR	0	0	281		191	
SBL	1	1700	194	.11*	130	.08*
SBT	1	1700	231	.28	192	.22
SBR	0	0	242		183	
EBL	1	1700	266	.16	288	.17*
EBT	3	5100	1180	.24*	1029	.21
EBR	0	0	67		41	
WBL	1	1700	244	.14*	127	.07
WBT	3	5100	624	.14	1152	.24*
WBR	0	0	107		63	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.79		.76

728 . Halladay St. E at Alton Pkwy.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	0.5		570		411	
SBT	0	1700	0	.39*	0	.25*
SBR	0.5		87		9	
EBL	1	1700	9	.01*	49	.03
EBT	1	1700	940	.55	1084	.64*
EBR	0	0	0		0	
WBL	1	1700	0	.00	0	.00
WBT	1	1700	953	.56*	934	.55
WBR	1	1700	501	.29	473	.28
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				1.01		.94

729 . Halladay St. W at Alton Pkwy.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0.5		3		30	
NBT	0.5	1700	0	.11*	0	.23*
NBR	0		176		361	
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	1	1700	664	.42*	634	.38
EBR	0	0	49		15	
WBL	0.5		411	{.24}*	236	
WBT	0.5	1700	587	.59	683	.54*
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.82		.82

730 . Grand Av. at Warner Av.

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	139	.08	228	.13
NBT	3	5100	634	.18*	639	.16*
NBR	0	0	297		162	
SBL	1	1700	363	.21*	286	.17*
SBT	3	5100	495	.14	508	.15
SBR	0	0	242		307	.18
EBL	2	3400	462	.14*	451	.13*
EBT	3	5100	1280	.25	794	.16
EBR	1	1700	170	.10	145	.09
WBL	2	3400	155	.05	218	.06
WBT	2	3400	620	.18*	1247	.37*
WBR	1	1700	284	.17	483	.28
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.76		.88

731 . Grand Av. at SR-55 SB Ramps

P2030 MPAH With Project (SANTA ANA ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	948	.28*	758	.22*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	573	.11	711	.14
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	410	.24*	339	.20*
WBT	0	0	0		0	
WBR	1	1700	339	.20	231	.14
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.57		.47

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\MPAHwProject\EXE-193\ICU\P30WP-MPAH-C-TUS01-110409

3 . Newport Av. at Edinger Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	387	.11*	584	.17*
NBT	3	5100	224	.04	778	.15
NBR	d	1700	109	.06	93	.05
SBL	2	3400	194	.06	51	.02
SBT	3	5100	889	.17*	430	.08*
SBR	1	1700	688	.40	302	.18
EBL	2	3400	324	.10	696	.20*
EBT	3	5100	1357	.27*	776	.15
EBR	1	1700	693	.41	743	.44
WBL	1	1700	178	.10*	197	.12
WBT	3	5100	1224	.24	1275	.25*
WBR	f		82		196	
Right Turn Adjustment		Multi	.16*			
Clearance Interval			.05*			.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .86 .75

14 . Walnut Av. at McFadden St.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	364	.11*	579	.17*
NBT	0	0	0		0	
NBR	1	1700	16	.01	109	.06
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	2	3400	376	.22*	521	.30*
EBR	0	0	624	.37	498	
WBL	1	1700	69	.04*	62	.04*
WBT	2	3400	741	.22	431	.13
WBR	0	0	0		0	
Right Turn Adjustment		EBR	.07*			
Clearance Interval			.05*			.05*

TOTAL CAPACITY UTILIZATION .49 .56

18 . Newport Av. at Bryan Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	77	.05*	134	.08
NBT	3	5100	734	.15	1594	.32*
NBR	0	0	20		35	
SBL	1	1700	72	.04	131	.08*
SBT	3	5100	2239	.45*	1320	.27
SBR	0	0	47		33	
EBL	1	1700	12	.01*	47	.03*
EBT	1	1700	23	.01	55	.03
EBR	1	1700	76	.04	180	.11
WBL	1	1700	34	.02	49	.03
WBT	1	1700	53	.03*	63	.04*
WBR	1	1700	215	.13	408	.24
Right Turn Adjustment					WBR	.14*
Clearance Interval			.05*			.05*

TOTAL CAPACITY UTILIZATION .59 .66

19 . Newport Av. at Main St.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	126	.07	210	.12*
NBT	3	5100	584	.13*	1454	.31
NBR	0	0	72		123	
SBL	1	1700	181	.11*	101	.06
SBT	3	5100	557	.16	1140	.26*
SBR	0	0	276		199	
EBL	1	1700	101	.06	223	.13*
EBT	2	3400	238	.07*	416	.12
EBR	1	1700	313	.18	233	.14
WBL	1	1700	320	.19*	237	.14
WBT	2	3400	307	.09	681	.20*
WBR	1	1700	14	.01	43	.03
Right Turn Adjustment		EBR	.05*			
Clearance Interval			.05*			.05*

TOTAL CAPACITY UTILIZATION .60 .76

20 . Newport Av. at El Camino Real

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	234	.14*	250	.15
NBT	3	5100	785	.18	1323	.29*
NBR	0	0	129		176	
SBL	1	1700	124	.07	194	.11*
SBT	3	5100	1907	.38*	1102	.23
SBR	0	0	30		93	
EBL	1	1700	16	.01	54	.03
EBT	1	1700	136	.08*	249	.15*
EBR	1	1700	396	.23	251	.15
WBL	1	1700	176	.10*	237	.14*
WBT	2	3400	236	.10	407	.16
WBR	0	0	89		143	
Right Turn Adjustment			EBR	.04*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .79 .74

21 . Newport Av. at I-5 NB Ramps

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	192	.11*	327	.19*
NBT	3	5100	1253	.25	2080	.41
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2005	.50*	1310	.35*
SBR	0	0	549		483	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .66 .59

22 . Newport Av. at Nisson Rd.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	1099	.23	1838	.38*
NBR	0	0	85		97	
SBL	1	1700	173	.10	247	.15*
SBT	3	5100	1787	.35*	1147	.22
SBR	0	0	0		0	
EBL	1.5		280		370	
EBT	0.5	3400	62	.10*	49	.12*
EBR	f		434		582	
WBL	1	1700	70	.04*	78	.05*
WBT	0	0	0		0	
WBR	1	1700	151	.09	173	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .75

23 . Newport Av. at McFadden St.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	42	.02*	67	.04*
NBT	3	5100	929	.18	1539	.30
NBR	0	0	11		16	
SBL	1	1700	18	.01	40	.02
SBT	3	5100	1803	.53*	1086	.29*
SBR	0	0	908	.53	415	
EBL	2	3400	311	.09*	537	.16*
EBT	0	0	1		9	
EBR	1	1700	67	.04	36	.02
WBL	0	0	0		0	
WBT	1	1700	0	.00*	0	.00*
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .69 .54

24 . Newport Av. at Walnut Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	41	.02	146	.09
NBT	3	5100	722	.16*	1122	.25*
NBR	0	0	89		144	
SBL	1	1700	737	.43*	528	.31*
SBT	3	5100	1125	.23	691	.15
SBR	0	0	46		59	
EBL	1	1700	122	.07*	46	.03*
EBT	2	3400	395	.16	418	.15
EBR	0	0	163		95	
WBL	1	1700	142	.08	154	.09
WBT	2	3400	302	.18*	466	.27*
WBR	0	0	357	.21	632	.37
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .89 .91

25 . Newport Av. at Sycamore Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	208	.12*	375	.22*
NBT	3	5100	417	.08	1079	.21
NBR	d	1700	109	.06	146	.09
SBL	1	1700	212	.12	222	.13
SBT	3	5100	1315	.26*	697	.14*
SBR	d	1700	90	.05	121	.07
EBL	1	1700	110	.06	95	.06*
EBT	2	3400	19	.01*	16	.01
EBR	0	0	60	.04	39	.02
WBL	1	1700	294	.17*	170	.10
WBT	2	3400	132	.08	319	.18*
WBR	0	0	183	.11	299	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .61 .65

27 . Del Amo Av. at Edinger Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		98	{.03}*	229	{.07}*
NBT	0.5	3400	4	.03	0	.07
NBR	1	1700	246	.14	250	.15
SBL	0	0	0		0	
SBT	1	1700	0	.00*	0	.00*
SBR	0	0	0		0	
EBL	1	1700	13	.01	7	.00
EBT	3	5100	1409	.28*	817	.16
EBR	d	1700	190	.11	80	.05
WBL	2	3400	171	.05*	263	.08
WBT	3	5100	1396	.27	1481	.29*
WBR	d	1700	0	.00	0	.00
Right Turn Adjustment		NBR		.06*		
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for NBR

TOTAL CAPACITY UTILIZATION .47 .41

35 . Red Hill Av. at Bryan Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	151	.09*	213	.13
NBT	3	5100	379	.10	794	.17*
NBR	0	0	134		69	
SBL	1	1700	107	.06	98	.06*
SBT	3	5100	841	.19*	426	.10
SBR	0	0	119		72	
EBL	1	1700	77	.05*	69	.04*
EBT	2	3400	600	.21	498	.19
EBR	0	0	117		158	
WBL	1	1700	92	.05	92	.05
WBT	2	3400	641	.22*	841	.29*
WBR	0	0	114		151	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .61

36 . Red Hill Av. at El Camino Real

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	317	.09*	441	.13
NBT	3	5100	603	.12	812	.16*
NBR	1	1700	161	.09	295	.17
SBL	1	1700	88	.05	250	.15*
SBT	3	5100	1265	.26*	591	.13
SBR	0	0	66		64	
EBL	1	1700	115	.07	34	.02
EBT	1.5	5100	298	{.10}*	965	.28*
EBR	1.5		308		160	
WBL	1.5		321	{.12}*	319	.19*
WBT	1.5	5100	255	.12	1025	.35
WBR	0		54		154	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .83

37 . Red Hill Av. at Nisson Rd.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	20	.01*	16	.01
NBT	4	6800	800	.12	1470	.22*
NBR	0	0	38		49	
SBL	1	1700	115	.07	173	.10*
SBT	3	5100	1421	.28*	725	.14
SBR	d	1700	108	.06	46	.03
EBL	1	1700	197	.12*	221	.13*
EBT	1	1700	67	.06	179	.12
EBR	0	0	35		29	
WBL	1	1700	44	.03	70	.04
WBT	1	1700	83	.19*	109	.18*
WBR	0	0	233		200	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .65 .68

38 . Red Hill Av. at Walnut Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	133	.08*	331	.19
NBT	3	5100	384	.11	1651	.36*
NBR	0	0	153		197	
SBL	1	1700	97	.06	126	.07*
SBT	3	5100	1290	.28*	490	.13
SBR	0	0	123		194	
EBL	1	1700	151	.09	221	.13*
EBT	2	3400	500	.27*	405	.16
EBR	0	0	419		133	
WBL	2	3400	249	.07*	231	.07
WBT	2	3400	421	.16	620	.22*
WBR	0	0	131		129	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .75 .83

39 . Red Hill Av. at Sycamore Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	96	.06*	519	.31*
NBT	3	5100	609	.13	1853	.38
NBR	0	0	33		100	
SBL	1	1700	52	.03	113	.07
SBT	3	5100	1721	.37*	640	.17*
SBR	0	0	168		230	
EBL	1	1700	78	.05*	84	.05*
EBT	1	1700	25	.01	37	.02
EBR	1	1700	146	.09	136	.08
WBL	1	1700	83	.05	44	.03
WBT	1	1700	146	.09*	41	.02*
WBR	1	1700	64	.04	53	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .60

40 . Red Hill Av. at Edinger Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	75	.02*	229	.07
NBT	3	5100	259	.05	1695	.33*
NBR	1	1700	207	.12	516	.30
SBL	2	3400	281	.08	155	.05*
SBT	3	5100	1339	.26*	418	.08
SBR	1	1700	289	.17	177	.10
EBL	2	3400	217	.06	265	.08*
EBT	3	5100	1028	.20*	710	.14
EBR	1	1700	240	.14	116	.07
WBL	2	3400	650	.19*	268	.08
WBT	3	5100	1183	.23	1025	.20*
WBR	1	1700	143	.08	476	.28
Right Turn Adjustment					WBR	.03*
Clearance Interval				.05*		.05*
Note: Assumes Right-Turn Overlap for WBR EBR						

TOTAL CAPACITY UTILIZATION .72 .74

41 . Red Hill Av. at Warner Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	529	.16*	801	.24
NBT	4	6800	631	.09	2213	.33*
NBR	1	1700	179	.11	264	.16
SBL	2	3400	112	.03	140	.04*
SBT	4	6800	1694	.25*	833	.12
SBR	1	1700	662	.39	438	.26
EBL	2	3400	327	.10*	372	.11*
EBT	3	5100	1078	.21	1190	.23
EBR	1	1700	381	.22	389	.23
WBL	2	3400	111	.03	193	.06
WBT	3	5100	1133	.22*	1201	.24*
WBR	1	1700	135	.08	235	.14
Right Turn Adjustment			SBR	.06*	SBR	.05*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .84 .82

55 . Browning Av. at Bryan Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	52	.03	87	.05
NBT	2	3400	338	.10*	650	.19*
NBR	d	1700	291	.17	82	.05
SBL	1	1700	110	.06*	62	.04*
SBT	2	3400	190	.06	127	.04
SBR	d	1700	49	.03	43	.03
EBL	1	1700	46	.03	26	.02
EBT	2	3400	819	.24*	1036	.30*
EBR	d	1700	76	.04	65	.04
WBL	1	1700	154	.09*	128	.08*
WBT	2	3400	179	.05	299	.09
WBR	1	1700	157	.09	143	.08
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .54 .66

56 . Browning Av. at El Camino Real

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	52	.03	123	.07
NBT	2	3400	241	.09*	415	.15*
NBR	0	0	67		102	
SBL	1	1700	118	.07*	64	.04*
SBT	2	3400	336	.10	180	.05
SBR	1	1700	96	.06	76	.04
EBL	1	1700	87	.05	93	.05*
EBT	2	3400	216	.08*	203	.08
EBR	0	0	68		64	
WBL	1	1700	76	.04*	125	.07
WBT	2	3400	202	.06	476	.14*
WBR	1	1700	102	.06	178	.10
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .33 .43

58 . Browning Av. at Walnut Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1	1700	221	.13*	118	.07*
SBT	0	0	0		0	
SBR	1	1700	160	.09	81	.05
EBL	1	1700	129	.08*	80	.05*
EBT	2	3400	879	.26	621	.18
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3400	580	.21*	1104	.44*
WBR	0	0	121		406	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .47 .61

92 . Tustin Ranch Rd. at Bryan Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	125	.07*	508	.30
NBT	3	5100	527	.10	2028	.40*
NBR	1	1700	70	.04	134	.08
SBL	1	1700	177	.10	109	.06*
SBT	3	5100	2122	.42*	677	.13
SBR	1	1700	166	.10	212	.12
EBL	2	3400	101	.03	137	.04*
EBT	2	3400	614	.18*	707	.21
EBR	1	1700	375	.22	175	.10
WBL	2	3400	268	.08*	179	.05
WBT	2	3400	280	.08	1043	.31*
WBR	d	1700	73	.04	198	.12
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for SBR NBR EBR

TOTAL CAPACITY UTILIZATION .80 .86

93 . Tustin Ranch Rd. at El Camino Real

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	123	.04*	539	.16
NBT	3	5100	431	.08	2267	.44*
NBR	d	1700	118	.07	298	.18
SBL	2	3400	102	.03	167	.05*
SBT	3	5100	2512	.49*	823	.16
SBR	d	1700	152	.09	72	.04
EBL	1	1700	165	.10	100	.06*
EBT	2	3400	190	.11*	346	.16
EBR	0	0	535	.31	195	
WBL	1	1700	260	.15*	222	.13
WBT	2	3400	205	.09	470	.24*
WBR	0	0	95		352	
Right Turn Adjustment		EBR	.17*			
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION 1.01 .84

94 . Tustin Ranch Rd. at I-5 NB Ramps

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	330	.10*	661	.19*
NBT	3	5100	920	.18	1599	.31
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2465	.48*	1003	.20*
SBR	f		40		459	
EBL	1.5		140	.08*	311	.09*
EBT	0	5100	0		0	
EBR	1.5		425	.13	277	{.02}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .71 .53

95 . Tustin Ranch Rd. at I-5 SB Ramps

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	163	.05*	244	.07
NBT	3	5100	943	.18	1778	.35*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	2321	.46*	965	.19
SBR	d	1700	573	.34	332	.20
EBL	1.5		711	{.29}*	590	.17*
EBT	0	5100	0	{.29}	0	
EBR	1.5		848		491	{.17}
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .85 .57

96 . Tustin Ranch Rd. at Walnut Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	69	.02*	257	.08
NBT	3	5100	490	.10	1389	.27*
NBR	d	1700	183	.11	335	.20
SBL	2	3400	841	.25	300	.09*
SBT	3	5100	1681	.33*	695	.14
SBR	d	1700	307	.18	235	.14
EBL	2	3400	280	.08	211	.06*
EBT	2	3400	893	.26*	459	.14
EBR	d	1700	198	.12	120	.07
WBL	2	3400	368	.11*	236	.07
WBT	2	3400	618	.18	710	.21*
WBR	d	1700	486	.29	414	.24
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .77 .68

109 . Myford Rd. at Bryan Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	58	.03*	162	.10
NBT	2	3400	67	.02	394	.15*
NBR	0	0	15		106	
SBL	1	1700	95	.06	40	.02*
SBT	2	3400	347	.13*	109	.06
SBR	0	0	108		82	
EBL	1	1700	76	.04*	79	.05*
EBT	2	3400	640	.19	635	.19
EBR	d	1700	105	.06	82	.05
WBL	1	1700	178	.10	89	.05
WBT	2	3400	944	.28*	1006	.30*
WBR	d	1700	37	.02	77	.05
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .53 .57

110 . Myford Rd. at El Camino Real

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	39	.02	107	.06
NBT	2	3400	69	.03*	215	.12*
NBR	0	0	33		198	
SBL	1	1700	207	.12*	121	.07*
SBT	2	3400	142	.08	48	.03
SBR	0	0	269	.16	131	.08
EBL	1	1700	16	.01	236	.14*
EBT	2	3400	140	.08*	501	.17
EBR	0	0	229	.13	93	
WBL	1	1700	159	.09*	110	.06
WBT	2	3400	252	.08	592	.23*
WBR	0	0	35		189	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .37 .61

111 . Franklin Av. at Walnut Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	96	.06*	244	.14*
NBT	2	3400	8	.00	11	.01
NBR	0	0	17	.01	14	.01
SBL	1	1700	39	.02	64	.04
SBT	2	3400	9	.01*	9	.01*
SBR	0	0	164	.10	457	.27
EBL	1	1700	390	.23*	241	.14*
EBT	2	3400	1037	.31	709	.21
EBR	d	1700	332	.20	131	.08
WBL	1	1700	70	.04	13	.01
WBT	2	3400	674	.20*	1609	.47*
WBR	d	1700	143	.08	74	.04
Right Turn Adjustment					SBR	.15*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.55		.96

445 . Tustin Ranch Rd. at Warner Av. N.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2.5	6800	377	.11*	1036	{.26}*
NBR	1.5		675	.20	944	
SBL	2	3400	555	.16*	356	.10*
SBT	3	5100	1230	.24	604	.12
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2.5		880	.17*	596	
WBT	0	6800	0		0	{.15}*
WBR	1.5		323	{.07}	534	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .49 .56

446 . Tustin Ranch Rd. at Warner Av. S.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	320	.09*	414	.12
NBT	3	5100	530	.10	949	.19*
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	680	.13*	328	.06
SBR	2	3400	1430	.42	876	.26
EBL	2	3400	520	.15*	1031	.30*
EBT	0	0	0		0	
EBR	1	1700	400	.24	642	.38
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			Multi	.20*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .54

447 . Armstrong Av. at Valencia Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	94	.03*	248	.07
NBT	1	1700	52	.03	283	.17*
NBR	d	1700	26	.02	149	.09
SBL	1	1700	39	.02	44	.03*
SBT	1	1700	333	.27*	123	.12
SBR	0	0	134		73	
EBL	1	1700	53	.03*	101	.06*
EBT	2	3400	225	.07	467	.14
EBR	1	1700	228	.13	142	.08
WBL	2	3400	129	.04	65	.02
WBT	2	3400	462	.14*	349	.12*
WBR	0	0	25		46	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .52 .43

448 . Armstrong Av. at Warner Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	64	.02	146	.04
NBT	2	3400	25	.01*	79	.04*
NBR	0	0	31	.02	56	
SBL	1	1700	65	.04*	40	.02*
SBT	2	3400	55	.02	45	.01
SBR	1	1700	131	.08	106	.06
EBL	1	1700	93	.05*	184	.11*
EBT	3	5100	1104	.22	1153	.23
EBR	1	1700	100	.06	147	.09
WBL	1	1700	55	.03	58	.03
WBT	3	5100	1125	.22*	1229	.24*
WBR	1	1700	51	.03	77	.05
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .38 .46

453 . Red Hill Ave. at Valencia Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	182	.05*	193	.06
NBT	4	6800	503	.07	2206	.32*
NBR	1	1700	129	.08	224	.13
SBL	2	3400	93	.03	115	.03*
SBT	4	6800	2005	.29*	681	.10
SBR	1	1700	242	.14	64	.04
EBL	1	1700	20	.01	157	.09*
EBT	2	3400	389	.11*	457	.13
EBR	1	1700	51	.03	84	.05
WBL	2	3400	187	.06*	136	.04
WBT	2	3400	507	.15	550	.16*
WBR	1	1700	77	.05	109	.06
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .56 .65

454 . Tustin Ranch Rd. at Valencia Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	242	.07*	333	.10
NBT	3	5100	341	.07	1195	.23*
NBR	1	1700	7	.00	67	.04
SBL	2	3400	66	.02	166	.05*
SBT	3	5100	1698	.33*	731	.14
SBR	1	1700	545	.32	208	.12
EBL	2	3400	202	.06*	678	.20*
EBT	1	1700	7	.00	57	.03
EBR	1	1700	111	.07	166	.10
WBL	1	1700	76	.04	23	.01
WBT	2	3400	145	.04*	40	.01*
WBR	1	1700	68	.04	47	.03
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .55 .54

455 . North Loop Rd. at Edinger Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	124	.07*	195	.11*
NBT	1	1700	1	.00	1	.00
NBR	1	1700	27	.02	36	.02
SBL	1	1700	1	.00	1	.00
SBT	1	1700	1	.00*	1	.00*
SBR	1	1700	1	.00	1	.00
EBL	1	1700	1	.00	1	.00
EBT	3	5100	463	.09*	154	.03*
EBR	0	0	0		0	
WBL	1	1700	170	.10*	190	.11*
WBT	3	5100	206	.04	315	.06
WBR	1	1700	1	.00	1	.00
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .31 .30

456 . North Loop Rd. at Valencia Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	193	.11*	65	.04*
NBT	1	1700	90	.05	144	.08
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	1	1700	128	.08*	134	.08*
SBR	1	1700	47	.03	26	.02
EBL	1	1700	10	.01*	79	.05*
EBT	0	0	0		0	
EBR	1	1700	62	.04	181	.11
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment					EBR	.03*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .25 .25

457 . North Loop Rd. at Moffett Dr.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	2	3400	32	.01	60	.02*
NBR	1	1700	8	.00	90	.05
SBL	1	1700	32	.02	80	.05*
SBT	2	3400	98	.03*	70	.02
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1700	82	.05*	40	.02*
WBT	0	0	0		0	
WBR	1	1700	108	.06	30	.02
Right Turn Adjustment					NBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.13		.15

478 . Red Hill Ave. at I-5 NB Ramps

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	483	.28*	456	.27*
NBT	3	5100	817	.16	1044	.20
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	3	5100	1336	.26*	731	.14*
SBR	1	1700	565	.33	309	.18
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		501		387	
WBT	0.5	3400	3	.15*	47	.13*
WBR	1	1700	325	.19	496	.29
Right Turn Adjustment			SBR	.07*	SBR	.04*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.81		.63

479 . Red Hill Ave. at I-5 SB Ramps

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	4	6800	1066	.16*	1092	.16*
NBR	1	1700	587	.35	523	.31
SBL	1	1700	499	.29*	367	.22*
SBT	4	6800	1319	.19	738	.11
SBR	0	0	0		0	
EBL	0.5		246	{.14}*	408	{.24}*
EBT	0.5	1700	0	.14	0	.24
EBR	1	1700	433	.25	332	.20
WBL	0	0	0		0	
WBT	0	0	0		0	
WBR	0	0	0		0	
Right Turn Adjustment			NBR	.19*	NBR	.15*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.83		.82

480 . Tustin Ranch Rd. at Edinger Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	19	.01*	111	.07*
NBT	0	0	0		0	
NBR	1	1700	2	.00	4	.00
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	508	.10*	166	.03
EBR	1	1700	190	.11	187	.11
WBL	2	3400	30	.01*	43	.01
WBT	3	5100	331	.06	489	.10*
WBR	0	0	0		0	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.17		.22

Source:V:\Recirculated Report\2030P-FutureConditions\Traffic Model\MPAHwProject\EXE-193\ICU\P30WP-MPAH-C-TUS02-110409

732 . Newport Av. at SR-55 NB Ramps

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	192	.06*	447	.13
NBT	3	5100	325	.10	976	.23*
NBR	0	0	209	.12	172	
SBL	1	1700	0	.00	56	.03*
SBT	2	3400	1010	.30*	407	.12
SBR	1	1700	189	.11	920	.54
EBL	2	3400	455	.13	469	.14*
EBT	1.5	3400	351	.15*	71	.04
EBR	0.5		170		53	
WBL	1	1700	70	.04*	180	.11
WBT	2	3400	83	.03	333	.12*
WBR	0	0	6		75	
Right Turn Adjustment					SBR	.30*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .60 .87

739 . Newport Av. at Mitchell Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	21	.01*	17	.01
NBT	3	5100	1047	.25	1632	.37*
NBR	0	0	239		253	
SBL	1	1700	92	.05	179	.11*
SBT	3	5100	2275	.46*	1324	.29
SBR	0	0	79		154	
EBL	1	1700	122	.07	100	.06*
EBT	1	1700	60	.05*	48	.04
EBR	0	0	24		22	
WBL	1	1700	177	.10*	184	.11
WBT	1	1700	51	.07	69	.12*
WBR	0	0	63		139	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .67 .71

740 . Red Hill Ave. at Mitchell Av.

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	36	.02	152	.09
NBT	3	5100	1530	.33*	1274	.29*
NBR	0	0	138		181	
SBL	1	1700	310	.18*	176	.10*
SBT	3	5100	1135	.25	766	.17
SBR	0	0	138		80	
EBL	0.5		34	{.02}*	131	
EBT	0.5	1700	42	.04	183	.18*
EBR	1	1700	15	.01	63	.04
WBL	0.5		40		22	{.01}*
WBT	0.5	1700	36	.04*	118	.08
WBR	1	1700	116	.07	115	.07
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .63

743 . Newport Avenue at Valencia

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	0	.00	0	.00
NBT	1	1700	150	.09	599	.35*
NBR	d	1700	19	.01	52	.03
SBL	2	3400	856	.25	506	.15*
SBT	1	1700	809	.48*	329	.19
SBR	d	1700	0	.00	5	.00
EBL	1	1700	4	.00	5	.00
EBT	1	1700	5	.00*	4	.00*
EBR	d	1700	1	.00	8	.00
WBL	1	1700	71	.04*	51	.03*
WBT	1	1700	10	.01	5	.00
WBR	2	3400	586	.17	902	.27
Right Turn Adjustment					WBR	.13*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .57 .71

745 . Tustin Ranch Road at Park Avenue

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	171	.05*	116	.03*
NBT	3	5100	547	.11	669	.13
NBR	1	1700	36	.02	25	.01
SBL	2	3400	75	.02	48	.01
SBT	3	5100	615	.12*	699	.14*
SBR	1	1700	383	.23	213	.13
EBL	2	3400	175	.05*	495	.15*
EBT	2	3400	99	.03	157	.05
EBR	1	1700	88	.05	278	.16
WBL	1	1700	68	.04	106	.06
WBT	1	1700	366	.22*	293	.17*
WBR	1	1700	128	.08	191	.11
Right Turn Adjustment			SBR	.07*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.56		.54

746 . Kensington Park Drive at Edinger Avenue

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	69	.02*	190	.06*
NBT	0	0	0		0	
NBR	1	1700	41	.02	171	.10
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	3	5100	1749	.34	2409	.47*
EBR	1	1700	228	.13	104	.06
WBL	2	3400	202	.06	76	.02*
WBT	3	5100	2611	.51*	1950	.38
WBR	0	0	0		0	
Right Turn Adjustment					NBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.58		.62

747 . Kensington Park Drive at Valencia Avenue

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	31	{.02}*	78	{.05}*
NBT	0	0	24		116	
NBR	0	0	35		189	
SBL	2	3400	57	.02	47	.01
SBT	0	0	198		35	
SBR	2	3400	46	.01	19	.01
EBL	2	3400	14	.00	40	.01
EBT	2	3400	198	.08	574	.18*
EBR	0	0	79		51	
WBL	0	0	253		74	{.04}*
WBT	2	3400	533	.23*	363	.13
WBR	1	1700	42	.02	64	.04
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.31		.32

748 . Armstrong Avenue at A Street

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	137	.08*	101	.06
NBT	2	3400	99	.03	179	.05*
NBR	d	1700	95	.06	102	.06
SBL	1	1700	78	.05	78	.05*
SBT	2	3400	108	.03*	127	.04
SBR	d	1700	114	.07	77	.05
EBL	2	3400	62	.02	113	.03
EBT	1	1700	530	.31*	560	.33*
EBR	d	1700	76	.04	100	.06
WBL	1	1700	56	.03*	103	.06*
WBT	1	1700	524	.31	573	.34
WBR	d	1700	40	.02	108	.06
Right Turn Adjustment			SBR	.02*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.52		.54

749 . Park Avenue at A Street

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	216	.06*	460	.14*
NBT	1	1700	30	.02	51	.03
NBR	d	1700	136	.08	528	.31
SBL	1	1700	2	.00	6	.00
SBT	1	1700	44	.03*	47	.03*
SBR	d	1700	4	.00	6	.00
EBL	1	1700	6	.00	5	.00
EBT	2	3400	231	.07*	403	.12*
EBR	d	1700	466	.27	332	.20
WBL	1	1700	520	.31*	305	.18*
WBT	2	3400	400	.12	321	.09
WBR	d	1700	4	.00	4	.00
Right Turn Adjustment			EBR	.15*		
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.67		.52

750 . Legacy Road at Warner Avenue

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	46	.03	80	.05
NBT	2	3400	92	.03*	101	.03*
NBR	1	1700	22	.01	49	.03
SBL	1	1700	66	.04*	207	.12*
SBT	2	3400	72	.02	78	.02
SBR	1	1700	142	.08	336	.20
EBL	2	3400	358	.11*	230	.07*
EBT	3	5100	752	.15	988	.19
EBR	1	1700	86	.05	38	.02
WBL	2	3400	61	.02	24	.01
WBT	3	5100	1022	.20*	929	.18*
WBR	1	1700	230	.14	131	.08
Right Turn Adjustment					SBR	.05*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.43		.50

751 . Tustin Ranch Road at Legacy Road

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	106	.03*	82	.02
NBT	3	5100	528	.10	1379	.27*
NBR	1	1700	64	.04	83	.05
SBL	2	3400	92	.03	72	.02*
SBT	3	5100	1633	.32*	793	.16
SBR	1	1700	146	.09	61	.04
EBL	1	1700	28	.02	112	.07*
EBT	2	3400	33	.01*	65	.02
EBR	1	1700	58	.03	83	.05
WBL	1	1700	69	.04*	74	.04
WBT	2	3400	58	.02	48	.01*
WBR	1	1700	33	.02	99	.06
Right Turn Adjustment					WBR	.03*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.45		.45

752 . Legacy Road at North Loop Road

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	48	.03*	20	.01*
NBT	2	3400	54	.02	23	.01
NBR	d	1700	8	.00	7	.00
SBL	1	1700	5	.00	21	.01
SBT	2	3400	8	.00*	48	.01*
SBR	d	1700	27	.02	61	.04
EBL	1	1700	26	.02*	45	.03*
EBT	1	1700	37	.02	131	.08
EBR	1	1700	7	.00	33	.02
WBL	1	1700	5	.00	9	.01
WBT	1	1700	165	.10*	99	.06*
WBR	d	1700	21	.01	12	.01
Right Turn Adjustment					SBR	.01*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.20		.17

753 . Tustin Ranch Road at Edinger Avenue Conne

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	620	.12	1854	.36*
NBR	1	1700	4	.00	66	.04
SBL	1	1700	16	.01	44	.03*
SBT	3	5100	2217	.43*	997	.20
SBR	0	0	0		0	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	2	3400	100	.03*	103	.03*
WBT	0	0	0		0	
WBR	1	1700	122	.07	126	.07
Right Turn Adjustment					WBR	.02*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.51		.49

754 . Red Hill Ave. at Carnegie

P2030 MPAH With Project (TUSTIN ISEC)

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	107	.06*	24	.01
NBT	4	6800	547	.08	2119	.31*
NBR	1	1700	93	.05	135	.08
SBL	2	3400	133	.04	99	.03*
SBT	4	6800	1298	.19*	749	.11
SBR	d	1700	118	.07	11	.01
EBL	1	1700	7	.00	122	.07
EBT	1	1700	121	.07	346	.20*
EBR	1	1700	8	.00	59	.03
WBL	1	1700	61	.04	75	.04*
WBT	0.5	3400	425	.25*	209	{.12}
WBR	1.5		91		225	{.11}
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.55		.63

Appendix C HCS Mainline Analysis

Appendix C-1 **Existing With Project Conditions Mainline HCS Reports**

Appendix C-2 **2015 Cumulative With Project Mainline HCS Reports**

Appendix C-3 **Post-2030 Cumulative With Project Mainline HCS Reports**

Appendix C-4 **Existing General Plan Build-out Mainline HCS Reports**

Appendix C-5 **Post-2030 Cumulative With Project (MPAH Network) Mainline HCS Reports**

Appendix C-1 Existing With Project Mainline HCS Reports

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	I-405 NB
From/To:	Jamboree to MacArthur
Jurisdiction:	Caltrans
Analysis Year:	2008
Description:	IBC Vision Traffic Study - Existing With Project

Flow Inputs and Adjustments

Volume, V	9193	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2419	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1984	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1984	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	65.2	mi/h
Number of lanes, N	5	
Density, D	30.5	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-405 NB
From/To:	Jamboree to MacArthur
Jurisdiction:	Caltrans
Analysis Year:	2008
Description:	IBC Vision Traffic Study - Existing With Project

Flow Inputs and Adjustments

Volume, V	8637	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2273	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1864	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1864	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	67.1	mi/h
Number of lanes, N	5	
Density, D	27.8	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	I-405 SB
From/To:	Jamboree to MacArthur
Jurisdiction:	Caltrans
Analysis Year:	2008
Description:	IBC Vision Traffic Study - Existing With Project

Flow Inputs and Adjustments

Volume, V	9407	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2476	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	2030	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2030	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	64.3	mi/h
Number of lanes, N	5	
Density, D	31.6	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-405 SB
From/To:	Jamboree to MacArthur
Jurisdiction:	Caltrans
Analysis Year:	2008
Description:	IBC Vision Traffic Study - Existing With Project

Flow Inputs and Adjustments

Volume, V	8444	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2222	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1822	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1822	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	67.6	mi/h
Number of lanes, N	5	
Density, D	27.0	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	I-405 SB
From/To:	MacArthur to SR-55
Jurisdiction:	Caltrans
Analysis Year:	2008
Description:	IBC Vision Traffic Study - Existing With Project

Flow Inputs and Adjustments

Volume, V	11036	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2904	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1985	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	6	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1985	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	65.1	mi/h
Number of lanes, N	6	
Density, D	30.5	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-405 SB
From/To:	MacArthur to SR-55
Jurisdiction:	Caltrans
Analysis Year:	2008
Description:	IBC Vision Traffic Study - Existing With Project

Flow Inputs and Adjustments

Volume, V	8505	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2238	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1529	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	6	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1529	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.7	mi/h
Number of lanes, N	6	
Density, D	21.9	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	NB SR-55
From/To:	MacArthur to Dyer
Jurisdiction:	Caltrans
Analysis Year:	2008
Description:	IBC Vision Traffic Study - Existing With Project

Flow Inputs and Adjustments

Volume, V	7377	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1941	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2000	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2000	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	64.9	mi/h
Number of lanes, N	4	
Density, D	30.8	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR-55 NB
From/To:	MacArthur to Dyer
Jurisdiction:	Caltrans
Analysis Year:	2008
Description:	IBC Vision Traffic Study - Existing With Project

Flow Inputs and Adjustments

Volume, V	5513	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1451	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1494	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1494	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.8	mi/h
Number of lanes, N	4	
Density, D	21.4	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Appendix C-2 2015 Cumulative With Project Mainline HCS Reports

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	I-405 NB
From/To:	MacArthur to SR-55
Jurisdiction:	Caltrans
Analysis Year:	2015
Description:	IBC Vision Traffic Study - Cumulative With Project

Flow Inputs and Adjustments

Volume, V	10900	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2868	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1960	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	6	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1960	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	65.6	mi/h
Number of lanes, N	6	
Density, D	29.9	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-405 NB
From/To:	MacArthur to SR-55
Jurisdiction:	Caltrans
Analysis Year:	2015
Description:	IBC Vision Traffic Study - Cumulative With Project

Flow Inputs and Adjustments

Volume, V	10064	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2648	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1810	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	6	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1810	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	67.7	mi/h
Number of lanes, N	6	
Density, D	26.7	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	I-405 SB
From/To:	MacArthur to SR-55
Jurisdiction:	Caltrans
Analysis Year:	2015
Description:	IBC Vision Traffic Study - Cumulative With Project

Flow Inputs and Adjustments

Volume, V	10317	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2715	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1855	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	6	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1855	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	67.2	mi/h
Number of lanes, N	6	
Density, D	27.6	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-405 SB
From/To:	MacArthur to SR-55
Jurisdiction:	Caltrans
Analysis Year:	2015
Description:	IBC Vision Traffic Study - Cumulative With Project

Flow Inputs and Adjustments

Volume, V	11174	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2941	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	2009	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	6	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2009	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	6	
Density, D	31.1	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Appendix C-3 **Post-2030 Cumulative With Project Mainline HCS Reports**

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	I-5 SB
From/To:	Jamboree to Tustin Ranch Road
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Flow Inputs and Adjustments

Volume, V	9075	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2388	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1968	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1968	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	65.4	mi/h
Number of lanes, N	5	
Density, D	30.1	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-5 SB
From/To:	Jamboree to Tustin Ranch Road
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Flow Inputs and Adjustments

Volume, V	9085	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2391	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1970	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1970	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	65.4	mi/h
Number of lanes, N	5	
Density, D	30.1	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	I-5 SB
From/To:	Tustin Ranch Road to Redhill
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Flow Inputs and Adjustments

Volume, V	9905	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2607	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2148	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2148	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	61.5	mi/h
Number of lanes, N	5	
Density, D	34.9	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-5 SB
From/To:	Tustin Ranch Road to Redhill
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Flow Inputs and Adjustments

Volume, V	9615	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2530	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2085	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2085	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	63.1	mi/h
Number of lanes, N	5	
Density, D	33.1	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	I-405 SB
From/To:	Jamboree to MacArthur
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Flow Inputs and Adjustments

Volume, V	8560	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2253	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1847	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1847	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	67.3	mi/h
Number of lanes, N	5	
Density, D	27.4	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-405 SB
From/To:	Jamboree to MacArthur
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Flow Inputs and Adjustments

Volume, V	9288	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2444	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	2004	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2004	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	64.8	mi/h
Number of lanes, N	5	
Density, D	30.9	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	NB SR-55
From/To:	MacArthur to Dyer
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Flow Inputs and Adjustments

Volume, V	7858	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2068	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1704	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1704	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	68.8	mi/h
Number of lanes, N	5	
Density, D	24.8	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR-55 NB
From/To:	MacArthur to Dyer
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Flow Inputs and Adjustments

Volume, V	9666	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2544	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2096	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2096	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	62.8	mi/h
Number of lanes, N	5	
Density, D	33.4	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	NB SR-55
From/To:	Dyer to Edinger
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Flow Inputs and Adjustments

Volume, V	7128	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1876	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1288	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	6	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1288	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	6	
Density, D	18.4	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR-55 NB
From/To:	Dyer to Edinger
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Flow Inputs and Adjustments

Volume, V	11696	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	3078	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2113	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	6	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2113	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	62.4	mi/h
Number of lanes, N	6	
Density, D	33.9	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Appendix C-4 **Existing General Plan Build-out Mainline HCS Reports**

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	NB SR-55
From/To:	MacArthur to Dyer
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Flow Inputs and Adjustments

Volume, V	7686	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2023	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1667	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1667	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.0	mi/h
Number of lanes, N	5	
Density, D	24.1	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR-55 NB
From/To:	MacArthur to Dyer
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Flow Inputs and Adjustments

Volume, V	9743	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2564	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2113	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2113	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	62.4	mi/h
Number of lanes, N	5	
Density, D	33.9	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	NB SR-55
From/To:	Dyer to Edinger
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Flow Inputs and Adjustments

Volume, V	6876	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1809	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1243	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	6	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1243	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	6	
Density, D	17.8	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR-55 NB
From/To:	Dyer to Edinger
Jurisdiction:	Caltrans
Analysis Year:	
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Flow Inputs and Adjustments

Volume, V	11843	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	3117	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	2140	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	6	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2140	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	61.7	mi/h
Number of lanes, N	6	
Density, D	34.7	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	NB SR-55
From/To:	Mcfadden to I-5
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Flow Inputs and Adjustments

Volume, V	7399	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1947	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1152	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	7	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1152	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	7	
Density, D	16.5	pc/mi/ln
Level of service, LOS	B	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR-55 NB
From/To:	Mcfadden to I-5
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Flow Inputs and Adjustments

Volume, V	12584	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	3312	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1959	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	7	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1959	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	65.6	mi/h
Number of lanes, N	7	
Density, D	29.9	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	SR-55 SB
From/To:	North of I-5
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Flow Inputs and Adjustments

Volume, V	9829	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2587	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	2142	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2142	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	61.7	mi/h
Number of lanes, N	5	
Density, D	34.7	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR-55 SB
From/To:	North of I-5
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Flow Inputs and Adjustments

Volume, V	7170	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1887	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1562	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1562	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.6	mi/h
Number of lanes, N	5	
Density, D	22.4	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	SR-73 NB
From/To:	Campus to SR-55
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Flow Inputs and Adjustments

Volume, V	8303	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2185	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	2207	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2207	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	59.9	mi/h
Number of lanes, N	4	
Density, D	36.8	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR-73 NB
From/To:	Campus to SR-55
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Flow Inputs and Adjustments

Volume, V	7282	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1916	v
Trucks and buses	2	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.990	
Driver population factor, fp	1.00	
Flow rate, vp	1935	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1935	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	66.0	mi/h
Number of lanes, N	4	
Density, D	29.3	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Appendix C-5 **Post-2030 Cumulative With Project (MPAH Network) Mainline HCS Reports**

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	I-405 SB
From/To:	Culver to Jamboree
Jurisdiction:	Caltrans
Analysis Year:	
Description:	IBC Vision Traffic Study - With Project (MPAH Network)

Flow Inputs and Adjustments

Volume, V	7435	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1957	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	2005	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2005	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	64.8	mi/h
Number of lanes, N	4	
Density, D	31.0	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I5-SB
From/To:	Culver to Jamboree
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - With Project (MPAH Network)

Flow Inputs and Adjustments

Volume, V	8735	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2299	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	2356	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	4	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	1.5	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2356	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	55.0	mi/h
Number of lanes, N	4	
Density, D	42.8	pc/mi/ln
Level of service, LOS	E	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	I-405 SB
From/To:	Jamboree to MacArthur
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - With Project (MPAH Network)

Flow Inputs and Adjustments

Volume, V	8855	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2330	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	1911	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1911	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	66.4	mi/h
Number of lanes, N	5	
Density, D	28.8	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	I-405 SB
From/To:	Jamboree to MacArthur
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - With Project (MPAH Network)

Flow Inputs and Adjustments

Volume, V	9295	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2446	v
Trucks and buses	5	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.976	
Driver population factor, fp	1.00	
Flow rate, vp	2006	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2006	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	64.7	mi/h
Number of lanes, N	5	
Density, D	31.0	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	SR-55 SB
From/To:	Dyer to Edinger
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - With Project (MPAH Network)

Flow Inputs and Adjustments

Volume, V	10746	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2828	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1942	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	6	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1942	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	65.9	mi/h
Number of lanes, N	6	
Density, D	29.5	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR-55 SB
From/To:	Dyer to Edinger
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - With Project (MPAH Network)

Flow Inputs and Adjustments

Volume, V	7462	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1964	v
Trucks and buses	6	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.971	
Driver population factor, fp	1.00	
Flow rate, vp	1348	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	6	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1348	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	70.0	mi/h
Number of lanes, N	6	
Density, D	19.3	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	AM Peak Hour
Freeway/Direction:	SR-55 SB
From/To:	North of I-5
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - With Project (MPAH Network)

Flow Inputs and Adjustments

Volume, V	9812	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	2582	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	2138	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	2138	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	61.8	mi/h
Number of lanes, N	5	
Density, D	34.6	pc/mi/ln
Level of service, LOS	D	

Overall results are not computed when free-flow speed is less than 55 mph.

Operational Analysis

Analyst:	PB
Agency or Company:	Parsons Brinckerhoff
Date Performed:	11/17/2009
Analysis Time Period:	PM Peak Hour
Freeway/Direction:	SR-55 SB
From/To:	North of I-5
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - With Project (MPAH Network)

Flow Inputs and Adjustments

Volume, V	7334	veh/h
Peak-hour factor, PHF	0.95	
Peak 15-min volume, v15	1930	v
Trucks and buses	7	%
Recreational vehicles	0	%
Terrain type:	Level	
Grade	0.00	%
Segment length	0.00	mi
Trucks and buses PCE, ET	1.5	
Recreational vehicle PCE, ER	1.2	
Heavy vehicle adjustment, fHV	0.966	
Driver population factor, fp	1.00	
Flow rate, vp	1598	pc/h/ln

Speed Inputs and Adjustments

Lane width	12.0	ft
Right-shoulder lateral clearance	6.0	ft
Interchange density	0.50	interchange/mi
Number of lanes, N	5	
Free-flow speed:	Measured	
FFS or BFFS	70.0	mi/h
Lane width adjustment, fLW	0.0	mi/h
Lateral clearance adjustment, fLC	0.0	mi/h
Interchange density adjustment, fID	0.0	mi/h
Number of lanes adjustment, fN	0.0	mi/h
Free-flow speed, FFS	70.0	mi/h
	Urban Freeway	

LOS and Performance Measures

Flow rate, vp	1598	pc/h/ln
Free-flow speed, FFS	70.0	mi/h
Average passenger-car speed, S	69.4	mi/h
Number of lanes, N	5	
Density, D	23.0	pc/mi/ln
Level of service, LOS	C	

Overall results are not computed when free-flow speed is less than 55 mph.

Appendix D HCS Ramp Analysis

Appendix D-1 **Existing With Project Conditions Ramps HCS Reports**

Appendix D-2 **2015 Cumulative With Project Ramps HCS Reports**

Appendix D-3 **Post-2030 Cumulative With Project Ramps HCS Reports**

Appendix D-4 **Existing General Plan Build-out Ramps HCS Reports**

Appendix D-5 **Post-2030 Cumulative With Project (MPAH Network) Ramps HCS Reports**

Appendix D-1 **Existing With Project Freeway Ramps HCS Reports**

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-405 SB
Junction:	Bristol
Jurisdiction:	Caltrans
Analysis Year:	2008
Description:	IBC Vision Traffic Study - Cumulative With Project

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	7103	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1020	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7103	1020		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1869	268		v
Trucks and buses	5	2		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.990		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	7664	1084		pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.082 Using Equation 4

$v_{12} = v_{F} (P_{FM})$ = 451 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6564	9600	No
$v_{3 \text{ or } av34}$	2514 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$ > 2700 pc/h?		No	
Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 2192		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2192	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 24.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.364	
Space mean speed in ramp influence area,	S_R = 59.8	mph
Space mean speed in outer lanes,	S_O = 65.9	mph
Space mean speed for all vehicles,	S = 62.7	mph

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-405 SB
Junction:	Bristol
Jurisdiction:	Caltrans
Analysis Year:	2008
Description:	IBC Vision Traffic Study - Cumulative With Project

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4789	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1416	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4789	1416		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1260	373		v
Trucks and buses	5	2		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.990		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	5167	1505		pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.030 Using Equation 4

$v_{12} = v_{F} (P_{FM}) =$ 120 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5536	9600	No
$v_{3 \text{ or } av34}$	1955 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$ > 2700 pc/h?		No	
Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 1612		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	1612	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 22.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.349	
Space mean speed in ramp influence area,	S_R = 60.2	mph
Space mean speed in outer lanes,	S_0 = 67.4	mph
Space mean speed for all vehicles,	S = 63.2	mph

Appendix D-2 **2015 Cumulative With Project Freeway Ramps HCS Reports**

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-405 SB
Junction:	Bristol
Jurisdiction:	Caltrans
Analysis Year:	2015
Description:	IBC Vision Traffic Study - Cumulative With Project

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6511	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1020	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6511	1020		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1713	268		v
Trucks and buses	5	2		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.990		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	7025	1084		pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.082 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 422 pc/h

Capacity Checks

		Actual	Maximum	LOS F?
v_{FO}		6213	9600	No
$v_{3 \text{ or } av34}$	v	2353 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$	v	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	v_{av34}	> 1.5 v_{12} /2	Yes	
If yes, v_{12A}		= 2051	(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2051	4600	No

Level of Service Determination (if not F)

Density, D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 23.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.351	
Space mean speed in ramp influence area,	S_R = 60.2	mph
Space mean speed in outer lanes,	S_O = 66.3	mph
Space mean speed for all vehicles,	S = 63.0	mph

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-405 SB
Junction:	Bristol
Jurisdiction:	Caltrans
Analysis Year:	2015
Description:	IBC Vision Traffic Study - Cumulative With Project

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6416	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1430	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6416	1430		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1688	376		v
Trucks and buses	5	2		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.976	0.990		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	6923	1520		pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.028 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 141 pc/h

Capacity Checks

		Actual	Maximum	LOS F?
v_{FO}		6574	9600	No
$v_{3 \text{ or } av34}$	v	2456 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$	v	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	v	> 1.5 v_{12} /2	Yes	
If yes, v_{12A}	= 2021		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2021	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 26.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.396	
Space mean speed in ramp influence area,	S_R = 58.9	mph
Space mean speed in outer lanes,	S_O = 66.3	mph
Space mean speed for all vehicles,	S = 62.1	mph

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	AM Peak
Freeway/Dir of Travel:	SR-73 NB
Junction:	MacArthur
Jurisdiction:	Caltrans
Analysis Year:	2015
Description:	IBC Vision Traffic Study - Cumulative With Project

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6536	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	865	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	230	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6536	865	230	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1720	228	61	v
Trucks and buses	2	1	1	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.995	0.995	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	6949	915	243	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.103 Using Equation 4

$v_{12} = v_{F} (P_{FM})$ = 719 pc/h

Capacity Checks

		Actual	Maximum	LOS F?
v_{FO}		7864	9600	No
$v_{3 \text{ or } av34}$	v	3115 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$	v	> 2700 pc/h?	Yes	
Is $v_{3 \text{ or } av34}$	v_{av34}	> 1.5 v_{12} /2	Yes	
If yes, v_{12A}		= 2779	(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2779	4600	No

Level of Service Determination (if not F)

Density, D_R = 5.475 + 0.00734 v_R + 0.0078 v_{12} - 0.00627 L_A = 27.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.418	
Space mean speed in ramp influence area,	S_R = 58.3	mph
Space mean speed in outer lanes,	S_0 = 64.3	mph
Space mean speed for all vehicles,	S = 61.3	mph

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	PM Peak
Freeway/Dir of Travel:	SR-73 NB
Junction:	MacArthur
Jurisdiction:	Caltrans
Analysis Year:	2015
Description:	IBC Vision Traffic Study - Cumulative With Project

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3442	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	867	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	750	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3442	867	750	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	906	228	197	v
Trucks and buses	2	1	1	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.990	0.995	0.995	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	3659	917	793	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.103 Using Equation 4

$v_{12} = v_{F} (P_{FM})$ = 378 pc/h

Capacity Checks

		Actual	Maximum	LOS F?
v_{FO}		4576	9600	No
$v_{3 \text{ or } av34}$		1640 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$	v	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	v	> 1.5 v_{12} /2	Yes	
If yes, v_{12A}	= 1463		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	1463	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 17.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S	= 0.303
Space mean speed in ramp influence area,	S_R	= 61.5 mph
Space mean speed in outer lanes,	S_O	= 67.8 mph
Space mean speed for all vehicles,	S	= 64.4 mph

Appendix D-3 **Post-2030 Cumulative With Project Freeway Ramps HCS Reports**

Diverge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-405 NB
Junction:	Culver
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	11411	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	1360	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	11411		1360			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	3003		358			v
Trucks and buses	5		2			%
Recreational vehicles	0		0			%
Terrain type:	Level		Level			
Grade	0.00	%	0.00	%	%	
Length	0.00	mi	0.00	mi	mi	
Trucks and buses PCE, ET	1.5		1.5			
Recreational vehicle PCE, ER	1.2		1.2			
Heavy vehicle adjustment, fHV	0.976		0.990			
Driver population factor, fP	1.00		1.00			
Flow rate, vp	12312		1446			pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v - v_F) P_{FD} = 5110$ pc/h

Capacity Checks

		Actual	Maximum	LOS F?
v_{Fi}	$= v_F$	9850	9600	Yes
v_{FO}	$= v - v_R$	8404	9600	No
v_R		1446	2000	No
v_{av34}		2370 pc/h	(Equation 25-15 or 25-16)	
Is v_{av34}	> 2700 pc/h?		No	
Is v_{av34}	$> 1.5\ v_{12}/2$		No	
If yes, v_{12A}	$= 5110$		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5110	4400	Yes

Level of Service Determination (if not F)

Density, $D = 4.252 + 0.0086\ v_R - 0.009\ L_D$ = 43.7 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	D_S = 0.623	
Space mean speed in ramp influence area,	S_R = 52.6	mph
Space mean speed in outer lanes,	S_O = 71.4	mph
Space mean speed for all vehicles,	S = 60.2	mph

Diverge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-405 NB
Junction:	Culver
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	8730	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	1270	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	8730		1270			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	2297		334			v
Trucks and buses	5		2			%
Recreational vehicles	0		0			%
Terrain type:	Level		Level			
Grade	0.00	%	0.00	%	%	
Length	0.00	mi	0.00	mi	mi	
Trucks and buses PCE, ET	1.5		1.5			
Recreational vehicle PCE, ER	1.2		1.2			
Heavy vehicle adjustment, fHV	0.976		0.990			
Driver population factor, fP	1.00		1.00			
Flow rate, vp	9419		1350			pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v - v_F) P_{FD} = 4047$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7536	9600	No
$v_{FO} = v - v_{FR}$	6186	9600	No
v_R	1350	2000	No
v_3 or v_{av34}	1744 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 $v_{12}/2$	No	
If yes, v_{12A}	= 4047	(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4047	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 34.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	D_S = 0.614	
Space mean speed in ramp influence area,	S_R = 52.8	mph
Space mean speed in outer lanes,	S_O = 73.9	mph
Space mean speed for all vehicles,	S = 60.8	mph

Diverge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	AM Peak
Freeway/Dir of Travel:	SR-55 NB
Junction:	Baker
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	7421	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	1450	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	7421		1450			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	1953		382			v
Trucks and buses	6		2			%
Recreational vehicles	0		0			%
Terrain type:	Level		Level			
Grade	0.00	%	0.00	%	%	
Length	0.00	mi	0.00	mi	mi	
Trucks and buses PCE, ET	1.5		1.5			
Recreational vehicle PCE, ER	1.2		1.2			
Heavy vehicle adjustment, fHV	0.971		0.990			
Driver population factor, fP	1.00		1.00			
Flow rate, vp	8046		1542			pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4378 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8046	9600	No
$v_{FO} = v - v_{FR}$	6504	9600	No
v_R	1542	2000	No
v_3 or v_{av34}	1834 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34} > 2700 pc/h?		No	
Is v_3 or v_{av34} > 1.5 v_{12} /2		No	
If yes, v_{12A} = 4378		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4378	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 37.4 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	D_S = 0.632	
Space mean speed in ramp influence area,	S_R = 52.3	mph
Space mean speed in outer lanes,	S_O = 73.5	mph
Space mean speed for all vehicles,	S = 60.2	mph

Diverge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	PM Peak
Freeway/Dir of Travel:	SR-55 NB
Junction:	Baker
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6048	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	1350	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	6048		1350			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	1592		355			v
Trucks and buses	6		2			%
Recreational vehicles	0		0			%
Terrain type:	Level		Level			
Grade	0.00	%	0.00	%	%	
Length	0.00	mi	0.00	mi	mi	
Trucks and buses PCE, ET	1.5		1.5			
Recreational vehicle PCE, ER	1.2		1.2			
Heavy vehicle adjustment, fHV	0.971		0.990			
Driver population factor, fP	1.00		1.00			
Flow rate, vp	6557		1435			pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v - v_F) P_{FD} = 3668$ pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6557	9600	No
$v_{FO} = v - v_R$	5122	9600	No
v_R	1435	2000	No
$v_{3 \text{ or } av34}$	1444 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$ > 2700 pc/h?		No	
Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2		No	
If yes, v_{12A} = 3668		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3668	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 31.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	D_S = 0.622	
Space mean speed in ramp influence area,	S_R = 52.6	mph
Space mean speed in outer lanes,	S_O = 75.1	mph
Space mean speed for all vehicles,	S = 60.6	mph

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	AM Peak
Freeway/Dir of Travel:	SR-55 SB
Junction:	MacArthur
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	8174	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	200	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	862	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8174	200	862	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	2151	53	227	v
Trucks and buses	6	2	2	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.990	0.990	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	8862	213	916	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.191 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1216 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6575	9600	No
$v_{3 \text{ or } av34}$	2573 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$ > 2700 pc/h?		No	
Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 2544		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2544	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 20.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.322	
Space mean speed in ramp influence area,	S_R = 61.0	mph
Space mean speed in outer lanes,	S_O = 64.9	mph
Space mean speed for all vehicles,	S = 63.2	mph

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	PM Peak
Freeway/Dir of Travel:	SR-55 SB
Junction:	MacArthur
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6802	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	870	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1214	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6802	870	1214	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1790	229	319	v
Trucks and buses	6	2	2	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.990	0.990	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7375	925	1291	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.102 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 550 pc/h

Capacity Checks

		Actual	Maximum	LOS F?
v_{FO}		6309	9600	No
$v_{3 \text{ or } av34}$	v	2417 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$	v	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	v_{12}	> 1.5 v_{12} /2	Yes	
If yes, v_{12A}		= 2153	(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2153	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 22.8 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.346	
Space mean speed in ramp influence area,	S_R = 60.3	mph
Space mean speed in outer lanes,	S_0 = 66.0	mph
Space mean speed for all vehicles,	S = 63.1	mph

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	AM Peak
Freeway/Dir of Travel:	SR-55 NB
Junction:	Dyer
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6738	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	390	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	550	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	200	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6738	390	550	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1773	103	145	v
Trucks and buses	6	2	2	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.990	0.990	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7305	415	585	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.166 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 885 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	5748	9600	No
$v_{3 \text{ or } av34}$	2224 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$ > 2700 pc/h?		No	
Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 2133		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2133	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 18.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.311	
Space mean speed in ramp influence area,	S_R = 61.3	mph
Space mean speed in outer lanes,	S_0 = 66.0	mph
Space mean speed for all vehicles,	S = 63.8	mph

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	PM Peak
Freeway/Dir of Travel:	SR-55 NB
Junction:	Dyer
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Cumulative With Project

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	10296	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1400	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1020	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	10296	1400	1020	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	2709	368	268	v
Trucks and buses	6	2	2	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.990	0.990	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	11163	1488	1084	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.032 Using Equation 4

$v_{12} = v_F (P_{FM}) =$ 275 pc/h

Capacity Checks

		Actual	Maximum	LOS F?
v_{FO}		10151	9600	Yes
$v_{3 \text{ or } av34}$	v	4194 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$	v	> 2700 pc/h?	Yes	
Is $v_{3 \text{ or } av34}$	v	> 1.5 v_{12} /2	Yes	
If yes, v_{12A}	= 3465		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	3465	4600	Yes

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A =$ 37.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 0.813	
Space mean speed in ramp influence area,	S_R = 47.2	mph
Space mean speed in outer lanes,	S_O = 61.7	mph
Space mean speed for all vehicles,	S = 53.7	mph

Appendix D-4 **Existing General Plan Build-out Ramps HCS Reports**

Diverge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	AM Peak
Freeway/Dir of Travel:	I-405 NB
Junction:	Culver
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	11558	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	1370	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	11558		1370			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	3042		361			v
Trucks and buses	5		2			%
Recreational vehicles	0		0			%
Terrain type:	Level		Level			
Grade	0.00	%	0.00	%	%	
Length	0.00	mi	0.00	mi	mi	
Trucks and buses PCE, ET	1.5		1.5			
Recreational vehicle PCE, ER	1.2		1.2			
Heavy vehicle adjustment, fHV	0.976		0.990			
Driver population factor, fP	1.00		1.00			
Flow rate, vp	12470		1457			pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v - v_F) P_{FD}$ = 5171 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	9976	9600	Yes
$v_{FO} = v - v_{FR}$	8519	9600	No
v_R	1457	2000	No
v_3 or v_{av34}	2402 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2	No	
If yes, v_{12A}	= 5171	(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	5171	4400	Yes

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 44.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	D_S = 0.624	
Space mean speed in ramp influence area,	S_R = 52.5	mph
Space mean speed in outer lanes,	S_O = 71.3	mph
Space mean speed for all vehicles,	S = 60.2	mph

Diverge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	PM Peak
Freeway/Dir of Travel:	I-405 NB
Junction:	Culver
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	8644	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	1270	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	8644		1270			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	2275		334			v
Trucks and buses	5		2			%
Recreational vehicles	0		0			%
Terrain type:	Level		Level			
Grade	0.00	%	0.00	%	%	
Length	0.00	mi	0.00	mi	mi	
Trucks and buses PCE, ET	1.5		1.5			
Recreational vehicle PCE, ER	1.2		1.2			
Heavy vehicle adjustment, fHV	0.976		0.990			
Driver population factor, fP	1.00		1.00			
Flow rate, vp	9326		1350			pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4014 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	7461	9600	No
$v_{FO} = v - v_F - v_R$	6111	9600	No
v_R	1350	2000	No
v_3 or v_{av34}	1723 pc/h	(Equation 25-15 or 25-16)	
Is v_3 or v_{av34}	> 2700 pc/h?	No	
Is v_3 or v_{av34}	> 1.5 $v_{12}/2$	No	
If yes, v_{12A}	= 4014	(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4014	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 34.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	D_S = 0.614
Space mean speed in ramp influence area,	S_R = 52.8 mph
Space mean speed in outer lanes,	S_O = 74.0 mph
Space mean speed for all vehicles,	S = 60.8 mph

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	AM Peak
Freeway/Dir of Travel:	SR-55 NB
Junction:	Victoria
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4489	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1634	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane	500	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4489	1634		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1181	430		v
Trucks and buses	6	2		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.971	0.990		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	4867	1737		pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.555 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2701 pc/h

Capacity Checks

		Actual	Maximum	LOS F?
v_{FO}		6604	7200	No
v_3 or v_{av34}		2166 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?		No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2		Yes	
If yes, v_{12A}	= 2781		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2781	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 24.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.528	
Space mean speed in ramp influence area,	S_R = 55.2	mph
Space mean speed in outer lanes,	S_O = 64.3	mph
Space mean speed for all vehicles,	S = 57.8	mph

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	PM Peak
Freeway/Dir of Travel:	SR-55 NB
Junction:	Victoria
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3604	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1171	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane	500	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3604	1171		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	948	308		v
Trucks and buses	6	2		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.971	0.990		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3907	1245		pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.555 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2168 pc/h

Capacity Checks

		Actual	Maximum	LOS F?
v_{FO}		5152	7200	No
$v_{3 \text{ or } av34}$	v	1739 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$	v	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	v	> 1.5 v_{12} /2	Yes	
If yes, v_{12A}	= 2232		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2232	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 16.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.297	
Space mean speed in ramp influence area,	S_R = 61.7	mph
Space mean speed in outer lanes,	S_O = 65.8	mph
Space mean speed for all vehicles,	S = 63.0	mph

Diverge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	AM Peak
Freeway/Dir of Travel:	SR-55 NB
Junction:	Baker
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	7472	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	1430	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	7472	1430		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1966	376		v
Trucks and buses	6	2		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	0.00 %	0.00 %	%	
Length	0.00 mi	0.00 mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.971	0.990		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	8101	1520		pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v - v_F) P_{FD}$ = 4389 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	8101	9600	No
$v_{FO} = v - v_{FR}$	6581	9600	No
v_R	1520	2000	No
$v_{3 \text{ or } av34}$	1856 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34} >$	2700 pc/h?	No	
Is $v_{3 \text{ or } av34} >$	1.5 v_{av34} /2	No	
If yes, v_{12A} =	4389	(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	4389	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 37.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence E

Speed Estimation

Intermediate speed variable,	D_S = 0.630	
Space mean speed in ramp influence area,	S_R = 52.4	mph
Space mean speed in outer lanes,	S_O = 73.5	mph
Space mean speed for all vehicles,	S = 60.3	mph

Diverge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	PM Peak
Freeway/Dir of Travel:	SR-55 NB
Junction:	Baker
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Freeway Data

Type of analysis	Diverge	
Number of lanes in freeway	4	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6016	vph

Off Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	30.0	mph
Volume on ramp	1350	vph
Length of first accel/decel lane	500	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent ramp		vph
Position of adjacent ramp		
Type of adjacent ramp		
Distance to adjacent ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway		Ramp		Adjacent Ramp	
Volume, V (vph)	6016		1350			vph
Peak-hour factor, PHF	0.95		0.95			
Peak 15-min volume, v15	1583		355			v
Trucks and buses	6		2			%
Recreational vehicles	0		0			%
Terrain type:	Level		Level			
Grade	0.00	%	0.00	%	%	
Length	0.00	mi	0.00	mi	mi	
Trucks and buses PCE, ET	1.5		1.5			
Recreational vehicle PCE, ER	1.2		1.2			
Heavy vehicle adjustment, fHV	0.971		0.990			
Driver population factor, fP	1.00		1.00			
Flow rate, vp	6523		1435			pcph

Estimation of V12 Diverge Areas

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = 0.436 Using Equation 8

$v_{12} = v_R + (v - v_F) P_{FD}$ = 3653 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$v_{Fi} = v_F$	6523	9600	No
$v_{FO} = v - v_{FR}$	5088	9600	No
v_R	1435	2000	No
$v_{3 \text{ or } av34}$	1435 pc/h	(Equation 25-15 or 25-16)	
Is $v_{3 \text{ or } av34}$ > 2700 pc/h?		No	
Is $v_{3 \text{ or } av34}$ > 1.5 v_{av34} / 2		No	
If yes, v_{12A} = 3653		(Equation 25-18)	

Flow Entering Diverge Influence Area

	Actual	Max Desirable	Violation?
v_{12}	3653	4400	No

Level of Service Determination (if not F)

Density, $D_R = 4.252 + 0.0086\ v_{12} - 0.009\ L_D$ = 31.2 pc/mi/ln

Level of service for ramp-freeway junction areas of influence D

Speed Estimation

Intermediate speed variable,	D_S = 0.622	
Space mean speed in ramp influence area,	S_R = 52.6	mph
Space mean speed in outer lanes,	S_O = 75.1	mph
Space mean speed for all vehicles,	S = 60.6	mph

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	AM Peak
Freeway/Dir of Travel:	SR-55 SB
Junction:	MacArthur
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	8024	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	190	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	856	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	8024	190	856	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	2112	50	225	v
Trucks and buses	6	2	2	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.990	0.990	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	8700	202	910	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.193 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 1194 pc/h

Capacity Checks

		Actual	Maximum	LOS F?
v_{FO}		6402	9600	No
v_3 or v_{av34}		2503 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?		No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2		Yes	
If yes, v_{12A}	= 2480		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2480	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 20.0+ pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.318	
Space mean speed in ramp influence area,	S_R = 61.1	mph
Space mean speed in outer lanes,	S_O = 65.1	mph
Space mean speed for all vehicles,	S = 63.4	mph

Merge Analysis

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date performed: 11/17/2009
Analysis time period: PM Peak
Freeway/Dir of Travel: SR-55 SB
Junction: MacArthur
Jurisdiction: Caltrans
Analysis Year: P2030
Description: IBC Vision Traffic Study - Existing General Plan Buildout

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6811	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	890	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1216	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6811	890	1216	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1792	234	320	v
Trucks and buses	6	2	2	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.990	0.990	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7385	946	1293	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.100 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 537 pc/h

Capacity Checks

		Actual	Maximum	LOS F?
v_{FO}		6338	9600	No
v_3 or v_{av34}	v	2427 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	v > 2700 pc/h?		No	
Is v_3 or v_{av34}	v > 1.5 v_{12} /2		Yes	
If yes, v_{12A}	= 2156		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2156	4600	No

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 23.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.348	
Space mean speed in ramp influence area,	S_R = 60.3	mph
Space mean speed in outer lanes,	S_0 = 66.0	mph
Space mean speed for all vehicles,	S = 63.1	mph

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	AM Peak
Freeway/Dir of Travel:	SR-55 NB
Junction:	Dyer
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	6546	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	330	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	550	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	200	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	6546	330	550	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	1723	87	145	v
Trucks and buses	6	2	2	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.990	0.990	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	7097	351	585	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.174 Using Equation 4

$v_{12} = v_{F}(P_{FM})$ = 901 pc/h

Capacity Checks

		Actual	Maximum	LOS F?
v_{FO}		5532	9600	No
v_{3} or v_{av34}		2140 pc/h	(Equation 25-4 or 25-5)	
Is v_{3} or v_{av34}	> 2700 pc/h?		No	
Is v_{3} or v_{av34}	> 1.5 $v_{12}/2$		Yes	
If yes, v_{12A}	= 2072		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2072	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A$ = 17.9 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable, M_S = 0.305

Space mean speed in ramp influence area, S_R = 61.5 mph

Space mean speed in outer lanes, S_O = 66.2 mph

Space mean speed for all vehicles, S = 64.0 mph

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	PM Peak
Freeway/Dir of Travel:	SR-55 NB
Junction:	Dyer
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	5	
Free-flow speed on freeway	70.0	mph
Volume on freeway	10373	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1470	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	Yes	
Volume on adjacent Ramp	1020	vph
Position of adjacent Ramp	Upstream	
Type of adjacent Ramp	On	
Distance to adjacent Ramp	2000	ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	10373	1470	1020	vph
Peak-hour factor, PHF	0.95	0.95	0.95	
Peak 15-min volume, v15	2730	387	268	v
Trucks and buses	6	2	2	%
Recreational vehicles	0	0	0	%
Terrain type:	Level	Level	Level	
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.990	0.990	
Driver population factor, fP	1.00	1.00	1.00	
Flow rate, vp	11247	1563	1084	pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.022 Using Equation 4

$v_{12} = v_F (P_{FM})$ = 196 pc/h

Capacity Checks

		Actual	Maximum	LOS F?
v_{FO}		10310	9600	Yes
$v_{3 \text{ or } av34}$	v_{av34}	4275 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$	v_{av34} > 2700 pc/h?		Yes	
Is $v_{3 \text{ or } av34}$	v_{av34} > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 3498			(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	3498	4600	Yes

Level of Service Determination (if not F)

Density, $D = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 38.0 pc/mi/ln

Level of service for ramp-freeway junction areas of influence F

Speed Estimation

Intermediate speed variable,	M_S = 0.876	
Space mean speed in ramp influence area,	S_R = 45.5	mph
Space mean speed in outer lanes,	S_0 = 61.5	mph
Space mean speed for all vehicles,	S = 52.4	mph

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	AM Peak
Freeway/Dir of Travel:	SR-261 SB
Junction:	Jamboree
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	2672	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1428	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	2672	1428		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	703	376		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.995	0.995		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	2827	1511		pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.605 Using Equation 1

$v_{12} = v_F (P_{FM}) =$ 1712 pc/h

Capacity Checks

		Actual	Maximum	LOS F?
v_{FO}		4338	7200	No
$v_{3 \text{ or } av34}$	v	1115 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$	v	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	v_{av34}	> 1.5 $v_{12}/2$	No	
If yes, v_{12A}	= 1712		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	1712	4600	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\, v_R + 0.0078\, v_{12} - 0.00627\, L_A =$ 23.6 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.359	
Space mean speed in ramp influence area,	S_R = 60.0	mph
Space mean speed in outer lanes,	S_0 = 67.8	mph
Space mean speed for all vehicles,	S = 61.8	mph

Merge Analysis

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date performed:	11/17/2009
Analysis time period:	PM Peak
Freeway/Dir of Travel:	SR-261 SB
Junction:	Jamboree
Jurisdiction:	Caltrans
Analysis Year:	P2030
Description:	IBC Vision Traffic Study - Existing General Plan Buildout

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	914	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	1	
Free-flow speed on ramp	30.0	mph
Volume on ramp	963	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane		ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	914	963		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	241	253		v
Trucks and buses	1	1		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.995	0.995		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	967	1019		pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.605 Using Equation 1

$v_{12} = v_F (P_{FM})$ = 586 pc/h

Capacity Checks

		Actual	Maximum	LOS F?
v_{FO}		1986	7200	No
v_3 or v_{av34}		381 pc/h	(Equation 25-4 or 25-5)	
Is v_3 or v_{av34}	> 2700 pc/h?		No	
Is v_3 or v_{av34}	> 1.5 v_{12} /2		No	
If yes, v_{12A}	= 586		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{R12}	586	4600	No

Level of Service Determination (if not F)

$D = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 11.3 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.280	
Space mean speed in ramp influence area,	S_R = 62.1	mph
Space mean speed in outer lanes,	S_0 = 70.0	mph
Space mean speed for all vehicles,	S = 63.5	mph

Appendix D-5 **Post-2030 Cumulative With Project (MPAH Network) Freeway Ramps HCS Reports**

Merge Analysis

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date performed: 11/17/2009
Analysis time period: AM Peak
Freeway/Dir of Travel: SR-55 NB
Junction: Victoria
Jurisdiction: Caltrans
Analysis Year: P2030
Description: IBC Vision Traffic Study - With Project (MPAH Network)

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	4469	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1627	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane	500	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	4469	1627		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	1176	428		v
Trucks and buses	6	2		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.971	0.990		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	4845	1730		pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.555 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2689 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
v_{FO}	6575	7200	No
$v_{3 \text{ or } av34}$	2156 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$ > 2700 pc/h?		No	
Is $v_{3 \text{ or } av34}$ > 1.5 v_{12} /2		Yes	
If yes, v_{12A} = 2768		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2768	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 24.1 pc/mi/ln

Level of service for ramp-freeway junction areas of influence C

Speed Estimation

Intermediate speed variable,	M_S = 0.521	
Space mean speed in ramp influence area,	S_R = 55.4	mph
Space mean speed in outer lanes,	S_O = 64.3	mph
Space mean speed for all vehicles,	S = 57.9	mph

Merge Analysis

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date performed: 11/17/2009
Analysis time period: PM Peak
Freeway/Dir of Travel: SR-55 NB
Junction: Victoria
Jurisdiction: Caltrans
Analysis Year: P2030
Description: IBC Vision Traffic Study - With Project (MPAH Network)

Freeway Data

Type of analysis	Merge	
Number of lanes in freeway	3	
Free-flow speed on freeway	70.0	mph
Volume on freeway	3653	vph

On Ramp Data

Side of freeway	Right	
Number of lanes in ramp	2	
Free-flow speed on ramp	30.0	mph
Volume on ramp	1162	vph
Length of first accel/decel lane	1000	ft
Length of second accel/decel lane	500	ft

Adjacent Ramp Data (if one exists)

Does adjacent ramp exist?	No	
Volume on adjacent Ramp		vph
Position of adjacent Ramp		
Type of adjacent Ramp		
Distance to adjacent Ramp		ft

Conversion to pc/h Under Base Conditions

Junction Components	Freeway	Ramp	Adjacent Ramp	
Volume, V (vph)	3653	1162		vph
Peak-hour factor, PHF	0.95	0.95		
Peak 15-min volume, v15	961	306		v
Trucks and buses	6	2		%
Recreational vehicles	0	0		%
Terrain type:	Level	Level		
Grade	%	%	%	
Length	mi	mi	mi	
Trucks and buses PCE, ET	1.5	1.5		
Recreational vehicle PCE, ER	1.2	1.2		
Heavy vehicle adjustment, fHV	0.971	0.990		
Driver population factor, fP	1.00	1.00		
Flow rate, vp	3961	1235		pcph

Estimation of V12 Merge Areas

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM} = 0.555 Using Equation 0

$v_{12} = v_F (P_{FM})$ = 2198 pc/h

Capacity Checks

		Actual	Maximum	LOS F?
v_{FO}		5196	7200	No
$v_{3 \text{ or } av34}$	v	1763 pc/h	(Equation 25-4 or 25-5)	
Is $v_{3 \text{ or } av34}$	v	> 2700 pc/h?	No	
Is $v_{3 \text{ or } av34}$	v_{av34}	> 1.5 v_{12} /2	Yes	
If yes, v_{12A}	= 2263		(Equation 25-8)	

Flow Entering Merge Influence Area

	Actual	Max Desirable	Violation?
v_{12A}	2263	4600	No

Level of Service Determination (if not F)

Density, $D_R = 5.475 + 0.00734\ v_R + 0.0078\ v_{12} - 0.00627\ L_A$ = 16.5 pc/mi/ln

Level of service for ramp-freeway junction areas of influence B

Speed Estimation

Intermediate speed variable,	M_S = 0.300	
Space mean speed in ramp influence area,	S_R = 61.6	mph
Space mean speed in outer lanes,	S_O = 65.7	mph
Space mean speed for all vehicles,	S = 62.9	mph

Appendix E Intersection Improvement List

IBC Vision Plan Intersection Lane Configurations

Loc #	Intersection (NS at EW)	Intersection Approach Lanes											
		Southbound			Westbound			Northbound			Eastbound		
		L	T	R	L	T	R	L	T	R	L	T	R
3	Newport Avenue at Edinger Avenue												
	Existing	0	0	0	1	3	0	2	0	1	0	3	11
	2015									2			
	Post 2030 Constraint	2	3	1			9		3	8	2		
	Post 2030 MPAH												
4	SR-55 SB Ramps at Edinger Avenue												
	Existing	1	1	0	1	2	0	1.5	0.5	9	1	2	9
	2015				2	3				2		3	
	Post 2030 Constraint												
	Post 2030 MPAH												
5	Hotel Terrace Drive at Dyer Road												
	Existing	0.5	1.5	1	2	3	1	1.5	0.5	2	1	3	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
6	Grand Avenue at Dyer Road												
	Existing	2	0	1	0	2	9	0	0	0	1	3	0
	2015												
	Post 2030 Constraint					3					2		
	Post 2030 MPAH												
7	SR-55 NB Ramps at Dyer Road												
	Existing	0	0	0	0	2.5	0.5	1.5	0	1.5	0	3	9
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH						1.5						
8	SR-55 SB Ramps at MacArthur Boulevard												
	Existing	2	0	2	0	3	9	0	0	0	0	2	9
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
9	SR-55 NB Ramps at MacArthur Boulevard												
	Existing	0	0	0	0	3	9	2	0	9	0	2	9
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
10	SR-55 Frontage Road SB Ramps at Paularino												
	Existing	0	2	0	1	2	0	0	0	0	0	2	0
	2015												
	Post 2030 Constraint			1									
	Post 2030 MPAH												
11	SR-55 Frontage Road NB Ramps at Paularino												
	Existing	0	0	0	0	2	0	0	2	8	1	2	0
	2015												
	Post 2030 Constraint						1						
	Post 2030 MPAH												

IBC Vision Plan Intersection Lane Configurations

12	SR-55 SB Frontage Road at Baker Street												
	Existing	0	2	0	1	2	0	0	0	0	0	2	1
	2015												
	Post 2030 Constraint			1								1.5	1.5
	Post 2030 MPAH												
13	SR-55 NB Frontage Road at Baker Street												
	Existing	0	0	0	0	2	1	0	2	0	1	2	0
	2015												
	Post 2030 Constraint							1.5	1.5		2		
	Post 2030 MPAH												
14	Walnut Avenue to McFadden Avenue												
	Existing	0	0	0	1	2	0	2	0	1	0	2	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
18	Newport Avenue at Bryan Avenue												
	Existing	1	2	8	1	1	1	1	2	8	1	1	1
	2015		3	0					3	0			
	Post 2030 Constraint												
	Post 2030 MPAH												
19	Newport Avenue at Main Street												
	Existing	1	2	1	1	2	1	1	2	8	1	2	1
	2015		3	0					3	0			
	Post 2030 Constraint												
	Post 2030 MPAH												
20	Newport Avenue at El Camino Real												
	Existing	1	3	0	1	2	0	1	2	8	1	1	1
	2015								3	0			
	Post 2030 Constraint												
	Post 2030 MPAH												
21	Newport Avenue at I-5 NB Ramps												
	Existing	0	2	1	0	0	0	1	2	0	0	0	0
	2015		3	0					3				
	Post 2030 Constraint												
	Post 2030 MPAH												
22	Newport Avenue at I-5 SB Ramps												
	Existing	1	2	0	1	0	1	0	2	1	1.5	0.5	1
	2015		3						3	0			
	Post 2030 Constraint												9
	Post 2030 MPAH												
23	Newport Avenue at McFadden Avenue												
	Existing	1	3	0	0	1	0	1	3	0	2	0	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
24	Newport Avenue at Walnut Avenue												
	Existing	1	2	8	1	2	0	1	2	8	1	2	0
	2015		3	0					3	0			
	Post 2030 Constraint												
	Post 2030 MPAH												

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25	Newport Avenue at Sycamore Avenue												
	Existing	1	1	1	0.5	1.5	0	1	1	8	1	1	0
	2015		3	0					2	0			
	Post 2030 Constraint			8	1	2			3	8		2	
	Post 2030 MPAH												
27	Del Amo Avenue at Edinger Avenue												
	Existing	0	1	0	2	3	8	1.5	0.5	11	1	3	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
28	Pullman Street at Warner Avenue												
	Existing	0	2	0	1	3	0	0.5	0.5	1	1	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
29	Pullman Street at Barranca Parkway												
	Existing	1	0.5	1.5	1	3	0	2	1	0	1	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH					4						4	
35	Red Hill Avenue at Bryan Avenue												
	Existing	1	2	1	1	2	0	1	2	1	1	2	0
	2015												
	Post 2030 Constraint		3	0					3	0			
	Post 2030 MPAH												
36	Red Hill Avenue at El Camino Real												
	Existing	1	3	0	1	1	0	2	3	1	1	1	1
	2015				1.5	1.5						1.5	1.5
	Post 2030 Constraint												
	Post 2030 MPAH												
37	Red Hill Avenue at Nisson Road												
	Existing	1	3	8	1	1	0	1	4	0	1	1	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
38	Red Hill Avenue at Walnut Avenue												
	Existing	1	2	8	1	2	0	1	3	0	1	2	0
	2015		3	0	2								
	Post 2030 Constraint												
	Post 2030 MPAH												
39	Red Hill Avenue at Sycamore Avenue												
	Existing	1	2	8	1	1	1	1	3	0	1	1	1
	2015		3	0									
	Post 2030 Constraint												
	Post 2030 MPAH												
40	Red Hill Avenue at Edinger Avenue												
	Existing	2	3	1	2	2	11	2	3	8	2	3	11
	2015					3				1			
	Post 2030 Constraint												
	Post 2030 MPAH												

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41	Red Hill Avenue at Warner Avenue												
	Existing	1	3	0	0	1	0	2	3	0	2	0	1
	2015	2		1	2	3	1			1		3	
	Post 2030 Constraint												
	Post 2030 MPAH		4						4				
42	Red Hill Avenue at Barranca Parkway/Dyer Road												
	Existing	2	3	0	1	3	0	2	3	0	1	3	0
	2015		4	8	2	4	1		4	8	2	4	
	Post 2030 Constraint												
	Post 2030 MPAH												
43	Red Hill Avenue at Deere Avenue												
	Existing	1	3	8	1	1	1	1	3	8	1	1	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH		4						4				
44	Red Hill Avenue at Alton Parkway												
	Existing	1	3	8	2	1	1	1	3	0	1	2	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH		4			2			4				
45	Red Hill Avenue at McGaw Avenue												
	Existing	2	3	8	2	2	0	2	3	0	1	2	0
	2015									1			
	Post 2030 Constraint												
	Post 2030 MPAH		4						4				
47	Red Hill Avenue at MacArthur Avenue												
	Existing	2	2	9	1	2	9	1	2	9	2	2	1
	2015		3			3			3	0		3	8
	Post 2030 Constraint												
	Post 2030 MPAH					4		2	4			4	
48	Red Hill Avenue at Sky Park North												
	Existing	1	2	8	1	1	0	1	2	8	1	1	1
	2015												
	Post 2030 Constraint		3						3				
	Post 2030 MPAH		4						4				
49	Red Hill Avenue at Main Street												
	Existing	2	2	0	2	3	0	2	2	1	2	3	0
	2015												
	Post 2030 Constraint			9									
	Post 2030 MPAH		4						3	9			
50	Red Hill Avenue at Paularino Avenue												
	Existing	1	2	0	1	2	0	2	2	0	1	2	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
51	Red Hill Avenue at Baker Street												
	Existing	1	2	0	1	2	0	2	2	0	1.5	1.5	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												

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52	Red Hill Avenue at Bristol Street												
	Existing	2	2	1	2	2.5	1.5	2	1.5	1.5	2	3	1
	2015												
	Post 2030 Constraint					3	1						
	Post 2030 MPAH												
55	Browning Avenue at Bryan Avenue												
	Existing	1	2	8	1	2	1	1	2	8	1	2	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
56	Browning Avenue at El Camino Real												
	Existing	1	0	1	0	1	1	0	0	0	0	2	0
	2015												
	Post 2030 Constraint		2		1	2		1	2		1		
	Post 2030 MPAH												
58	Browning Avenue at Walnut Avenue												
	Existing	1	0	1	0	2	0	0	0	0	1	2	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
61	Campus Drive at Airport Way												
	Existing	0	0	2	0	3	0	0	0	0	1	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
62	Campus Drive at Bristol Street NB												
	Existing	0	4	2	1	4	0	2	3	0	0	0	0
	2015												
	Post 2030 Constraint					5							
	Post 2030 MPAH												
63	Campus Drive at Bristol Street SB												
	Existing	1	3	0	0	0	0	0	5	0	1.5	2.5	2
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
64	Birch Street at Bristol Street NB												
	Existing	0	1.5	2.5	1.5	3.5	0	2	2	0	0	0	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
65	Birch Street at Bristol Street SB												
	Existing	2	2	0	0	0	0	0	2.5	1.5	1.5	3	0.5
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
70	Gillette Avenue at Main Street												
	Existing	2	1	8	2	3	0	2	1	1	2	4	9
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH						1						

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71	Armstrong Avenue at Barranca Avenue												
	Existing	0	0	0	1	3	0	2	0	1	1	3	8
	2015	1	1	1		4		1	1				
	Post 2030 Constraint											4	
	Post 2030 MPAH												
77	MacArthur Boulevard at Sky Park East												
	Existing	0	4	0	0	0	0	1	3	0	2	0	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH								4				
78	MacArthur Boulevard at Main Street												
	Existing	2	4	1	2	3	9	2	4	9	1	3	11
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
79	MacArthur Boulevard at I-405 NB Ramps												
	Existing	2	4	0	2	0	2	0	4	2	0	0	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
80	MacArthur Boulevard at I-405 SB Ramps												
	Existing	2	4	1	2	1	9	0	4	1	0	0	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
82	MacArthur Boulevard at Michelson Drive												
	Existing	2	4	0	2	1	11	1	4	1	2	2	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH							2					
83	MacArthur Boulevard at Douglas Avenue												
	Existing	2	4	0	1	0	1	0	4	0	0	0	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
84	MacArthur Boulevard at Campus Drive												
	Existing	1	4	1	2	3	9	1	4	1	2	3	8
	2015												
	Post 2030 Constraint		3.5	1.5				2					
	Post 2030 MPAH												1
85	MacArthur Boulevard at Birch Street												
	Existing	1	4	0	1	2	9	1	3	9	1.5	1.5	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
87	Dupont Drive at Michelson Drive												
	Existing	1	2	0	1	3	0	1	2	0	1	2	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												

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92	Tustin Ranch Road at Bryan Avenue												
	Existing	1	3	11	2	2	8	1	3	11	2	2	11
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
93	Tustin Ranch Road at El Camino Real												
	Existing	2	3	8	1	2	0	2	3	8	1	2	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
94	Tustin Ranch Road at I-5 NB Ramps												
	Existing	0	3	9	0	0	0	2	3	0	1.5	0	1.5
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
95	Tustin Ranch Road at I-5 SB Ramps												
	Existing	0	3	8	0	0	0	2	3	0	1.5	0	1.5
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
96	Tustin Ranch Road at Walnut Avenue												
	Existing	1.5	0	1.5	0	2	1	0	0	0	1	2	8
	2015	2	3	8	2		8	2	3	8	2		
	Post 2030 Constraint												
	Post 2030 MPAH												
97	Von Karman Avenue/Tustin Ranch Road at Barranca Parkway												
	Existing	2	2	2	2	3	1	2	2	8	1	3	8
	2015					4							
	Post 2030 Constraint										2		1
	Post 2030 MPAH									9		4	
98	Von Karman Avenue at Alton Parkway												
	Existing	1	2	8	1	2	8	1	2	8	1	2	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH		3			3			3			3	
99	Von Karman Avenue at McGaw Avenue												
	Existing	1	2	8	1	2	0	1	2	8	1	2	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH		3						3				
100	Von Karman Avenue at Main Street												
	Existing	1	2	1	2	3	0	2	2	1	2	3	9
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH		3				1		3				
101	Von Karman Avenue at Morse Avenue												
	Existing	1	2	9	1	1	0	2	2	0	1	1	9
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH		3						3				

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102	Von Karman Avenue at Michelson Drive												
	Existing	1	2	0	1	2	9	1	2	1	1	2	0
	2015												
	Post 2030 Constraint										2		
	Post 2030 MPAH			1									
103	Von Karman Avenue at Dupont Drive												
	Existing	1	2	1	1	2	0	1	2	0	1	2	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
104	Von Karman Avenue at Martin												
	Existing	1	2	0	1	1	0	1	2	1	2	1	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
105	Von Karman Avenue at Campus Drive												
	Existing	1	2	0	1	2	0	1	2	9	1	2	9
	2015												
	Post 2030 Constraint										2		0
	Post 2030 MPAH												
106	Von Karman Avenue at Birch Street												
	Existing	1	2	0	1	2	0	1	2	0	1	2	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
107	Von Karman Avenue at MacArthur Boulevard												
	Existing	2	1	9	1	3	9	1	2	9	1	3	9
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
109	Myford Road at Bryan Avenue												
	Existing	1	2	0	1	2	8	1	2	0	1	2	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
110	Myford Road at El Camino Real												
	Existing	1	1	1	1	2	0	1	2	0	1	2	0
	2015												
	Post 2030 Constraint		2	0									
	Post 2030 MPAH												
111	Franklin Avenue at Walnut Avenue												
	Existing	1	2	0	1	2	8	1	2	0	1	2	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
112	Myford Road at Michelle Drive												
	Existing	0	0	0	1	2	0	2	0	1	0	2	8
	2015												
	Post 2030 Constraint	1	2					1	2	0	1		
	Post 2030 MPAH												

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113	Myford Road at Walnut Avenue												
	Existing	2	1	1	2	2	1	1	1	9	1	2	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
114	Millikan Avenue/District Way at Barranca Parkway												
	Existing	2	0.5	1.5	1	2	1	1	2	8	2	3	8
	2015					4							
	Post 2030 Constraint												
	Post 2030 MPAH											4	0
115	Millikan Avenue at Alton Parkway												
	Existing	1	1	1	1	2	8	1	1	1	1	2	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH					3						3	
116	Cartwright Road at Main Street												
	Existing	2	1	0	2	3	0	1	1	1	1	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH						1						1
119	Teller Avenue at Michelson Drive												
	Existing	1	1	1	1	3	1	1	1	1	1	3	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
121	Teller Avenue at Campus Drive												
	Existing	1	1	0	1	2	0	1	1	1	1	2	9
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
126	Jamboree Road at Bryan Avenue												
	Existing	2	4	8	2	2	1	2	4	1	2	2	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
127	Jamboree Road at El Camino Real												
	Existing	1	4	1	2	2	0	2	4	1	1	1	2
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
128	Jamboree Road at I-5 NB Ramps												
	Existing	0	3	9	1.5	0	1.5	0	3	9	0	0	0
	2015		4						4				
	Post 2030 Constraint												
	Post 2030 MPAH												
129	Jamboree Road at I-5 SB Ramps												
	Existing	0	3	9	0	0	0	0	3	9	1.5	0	1.5
	2015		4						4		2		2
	Post 2030 Constraint												
	Post 2030 MPAH												

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130	Jamboree Road at Michelle Drive												
	Existing	1	3	8	1	1	0	1	3	8	2	1	1
	2015		4						4			0.5	1.5
	Post 2030 Constraint												
	Post 2030 MPAH												
131	Jamboree Road SB at Walnut Avenue												
	Existing	2	2	1	2	3	0	0	0	0	0	3	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
132	Jamboree Road NB at Walnut Avenue												
	Existing	0	0	0	0	3	1	2	2	8	2	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
133	Jamboree Road at Edinger Avenue												
	Existing	2	0	9	2	3	1	2	0	1	2	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
134	Loop Road/Park Avenue at Warner Avenue												
	Existing	1	2	1	2	2	1	1	1	1	1	2	1
	2015												
	Post 2030 Constraint			9					2		2		
	Post 2030 MPAH												
136	Jamboree Road at Barranca Avenue												
	Existing	2	4	9	-2	-3	-9	2	4	9	-2.5	-2.5	-1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												-9
137	Jamboree Road at Beckman Avenue												
	Existing	1	4	0	1	1	0	1	4	0	1	1	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH		5						5				
138	Jamboree Road at Alton Parkway												
	Existing	2	4	0	2	3	8	2	4	1	2	3	0
	2015												
	Post 2030 Constraint								5				
	Post 2030 MPAH		5										
139	Jamboree Road at McGaw Avenue												
	Existing	2	4	0	1	2	0	2	4	0	1	2	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH			1									
140	Jamboree Road at Kelvin Avenue												
	Existing	1	4	8	1	1	0	1	4	0	1	1	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												

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141	Jamboree Road at Main Street												
	Existing	2	4	1	2	3	9	2	4	9	2	3	9
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH											4	
143	Jamboree Road at I-405 NB Ramps												
	Existing	0	4	9	3	0	9	0	3	9	0	0	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH								4				
144	Jamboree Road at I-405 SB Ramps												
	Existing	0	4	9	0	0	0	0	4	9	1.5	0	2.5
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
145	Jamboree Road at Michelson Drive												
	Existing	2	4	9	2	2	9	1	4	1	2	2	0
	2015												
	Post 2030 Constraint									9			
	Post 2030 MPAH												1
146	Jamboree Road at Dupont Road												
	Existing	1	3	8	1	2	0	1	4	1	1	2	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
147	Jamboree Road at Campus Drive												
	Existing	2	3	0	2	2	1	2	4	0	2	2	9
	2015												
	Post 2030 Constraint		4				11			11			
	Post 2030 MPAH												
148	Jamboree Road at Birch Street												
	Existing	1	3	9	0	1	0	1	3	0	1.5	0.5	9
	2015												
	Post 2030 Constraint		4										
	Post 2030 MPAH												
149	Jamboree Road at Fairchild Road												
	Existing	2	4	8	1	1	1	1	3	0	1	1	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
150	Jamboree Road at MacArthur Boulevard												
	Existing	2	3	1	2	3	1	2	3	1	2	3	9
	2015												
	Post 2030 Constraint	3							4				
	Post 2030 MPAH												
151	Jamboree Road at Bristol Street NB												
	Existing	0	2.5	1.5	0	0	0	2	1.5	1.5	0	0	0
	2015												
	Post 2030 Constraint								3	9			
	Post 2030 MPAH												

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153	Jamboree Road at Bristol Street SB												
	Existing	0	3	0	0	0	0	0	5	0	1.5	1.5	2
	2015												
	Post 2030 Constraint		4						6		2.5		
	Post 2030 MPAH												
154	Jamboree Road at Eastbluff Drive												
	Existing	2	3	1	1.5	1.5	9	1	3	1	1.5	0.5	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
155	Jamboree Road at Bison Avenue												
	Existing	2	3	1	2	0	2	0	3	8	1	0	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
156	Jamboree Road at Ford Road												
	Existing	1	3	1	1.5	1.5	1	2	3	0	1.5	1.5	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
164	Construction Circle South at Barranca Parkway												
	Existing	1	1	1	1	3	8	1	1	0	1	3	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
168	Murphy Avenue at Alton Parkway												
	Existing	1	1	0	1	3	8	1	1	0	1	3	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
170	Union at Main Street												
	Existing	1	1	1	2	3	0	2	1	0	2	3	9
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH						1						
171	Veneto at Main Street												
	Existing	1	1	0	2	3	0	2	1	0	1	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH						1						1
174	Carlson Avenue at Michelson Drive												
	Existing	2	1	9	1	2	9	2	2	1	2	2	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
175	Carlson Avenue at Campus Drive												
	Existing	1	0	1	0	1	8	0	0	0	1	1	0
	2015												
	Post 2030 Constraint					2						2	
	Post 2030 MPAH												

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176	Fairchild Avenue at MacArthur Boulevard												
	Existing	1	0	1	0	3	0	0	0	0	1	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
178	MacArthur Boulevard at Bison Avenue												
	Existing	2	4	1	2	2	1	2	4	1	2	2	9
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
179	MacArthur Boulevard at Ford Road												
	Existing	2	4	9	2	2	9	2	4	9	2	2	1
	2015												
	Post 2030 Constraint	3											
	Post 2030 MPAH												
180	Harvard Avenue at Walnut Avenue												
	Existing	1	1	1	1	2	8	2	1	8	1	2	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
181	Harvard Avenue at Edinger Avenue-Irvine Center Drive												
	Existing	1	2	8	2	3	0	2	2	1	2	3	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
182	Harvard Avenue at Paseo Westpark/Moffett Drive												
	Existing	1	2	1	1	1	8	1	2	8	1	1	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
183	Harvard Avenue at Warner Avenue												
	Existing	1	2	8	1	2	8	1	2	8	1	2	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
184	Harvard Avenue at Barranca Parkway												
	Existing	1	2	1	2	3	0	1	2	1	2	3	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
185	Harvard Avenue at Alton Parkway												
	Existing	1	2	1	2	3	0	1	2	8	2	3	1
	2015												
	Post 2030 Constraint							2					
	Post 2030 MPAH												
186	Harvard Avenue at Main Street												
	Existing	2	2	1	2	3	0	2	2	1	2	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH			9									1

IBC Vision Plan Intersection Lane Configurations

187	Harvard Avenue at Coronado												
	Existing	1	2	8	1	1	1	2	2	0	2	1	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
188	Harvard Avenue at Michelson Drive												
	Existing	1	2	1	1	2	0	1	2	0	2	2	9
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH			9									
189	Harvard Avenue at University Drive												
	Existing	1	2	8	1	3	0	1	2	8	1	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
190	University Drive at Campus Drive												
	Existing	1	2	1	1	2	8	1	3	1	1	2	8
	2015												
	Post 2030 Constraint	2	3		2			2			2		
	Post 2030 MPAH												
191	Mesa Road at University Drive												
	Existing	0	0	0	1	2	0	1	0	1	0	2	1
	2015												
	Post 2030 Constraint					3						3	
	Post 2030 MPAH												
192	California Avenue at University Drive												
	Existing	0	0	0	1	2	0	2	0	1	0	2	1
	2015				2								
	Post 2030 Constraint					3						3	
	Post 2030 MPAH												
193	MacArthur Boulevard NB at University Drive												
	Existing	0	0	0	2	2	0	1	0	1	0	3	8
	2015												
	Post 2030 Constraint					3							
	Post 2030 MPAH												
194	MacArthur Boulevard SB at University Drive												
	Existing	0	0	0	2	3	0	1	0	1	0	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
195	SR-73 SB Ramps at University Drive												
	Existing	1	0	1	0	3	0	0	0	0	0	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
196	Hearthstone Boulevard at Irvine Center Drive												
	Existing	1	1	8	1	3	0	1	2	8	1	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												

IBC Vision Plan Intersection Lane Configurations

198	Paseo Westpark at Warner Avenue												
	Existing	1	1	8	1	2	8	1	1	8	1	2	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
199	Paseo Westpark at Barranca Parkway												
	Existing	2	1	8	1	3	0	2	1	1	1	3	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
200	Paseo Westpark at Alton Parkway												
	Existing	1	1	1	1	3	8	1	1	0	1	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
201	Paseo Westpark at Main Street												
	Existing	1	1	1	1	2	8	1	1	0	1	2	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
221	Culver Drive at Bryan Avenue												
	Existing	2	3	8	2	2	0	2	3	11	2	2	1
	2015											1.5	1.5
	Post 2030 Constraint												
	Post 2030 MPAH												
222	Culver Drive at Trabuco Road												
	Existing	1	3	9	2	0	2	0	3	9	0	0	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
223	Culver Drive at I-5 SB Ramps												
	Existing	0	3	9	0	0	0	0	3	9	1.5	0	1.5
	2015										3		2
	Post 2030 Constraint												
	Post 2030 MPAH												
224	Culver Drive at Walnut Avenue												
	Existing	2	3	8	2	2	8	2	3	11	2	2	0
	2015			1			1						1
	Post 2030 Constraint												
	Post 2030 MPAH												
225	Culver Drive at Deerfield Drive												
	Existing	2	3	1	1	1	0	2	3	1	1	1	8
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
226	Culver Drive at Irvine Center Drive												
	Existing	2	4	1	2	3	9	2	4	9	2	3	9
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												

IBC Vision Plan Intersection Lane Configurations

227	Culver Drive at Warner Avenue												
	Existing	1	3	8	1	2	8	1	3	1	1	2	8
	2015										2		
	Post 2030 Constraint												
	Post 2030 MPAH												
228	Culver Drive at Barranca Parkway												
	Existing	2	3	9	2	2	8	2	3	1	2	2	1
	2015												
	Post 2030 Constraint					3	0						
	Post 2030 MPAH												
229	Culver Drive at Alton Parkway												
	Existing	2	3	9	2	2	1	2	3	1	2	2	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
230	Culver Drive at Main Street												
	Existing	2	3	9	2	2	1	2	3	1	2	2	9
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
231	Culver Drive at San Leandro												
	Existing	0	3	8	0	0	0	1	3	0	1	0	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
232	Culver Drive at I-405 NB Ramps												
	Existing	0	3	9	2	0	1	0	3	9	0	0	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
233	Culver Drive at I-405 SB Ramps												
	Existing	0	3	9	0	0	0	0	3	9	1.5	0	1.5
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
234	Culver Drive at Michelson Drive												
	Existing	2	3	1	1	2	1	2	3	0	2	1	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
235	Culver Drive at University Drive												
	Existing	1	3	0	2	3	0	1	3	8	2	3	0
	2015									12			
	Post 2030 Constraint	2	4	8					4				8
	Post 2030 MPAH												
337	Von Karman Avenue at Quartz												
	Existing	1	2	8	1	1	9	1	2	1	2	1	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH		3						3				

IBC Vision Plan Intersection Lane Configurations

439	Bixby at Michelson Drive												
	Existing	2	1	0	1	2	1	1	1	0	1	2	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
440	Siglo at Main Street												
	Existing	2	0	1	0	3	1	0	0	0	2	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
441	Loop Road at Jamboree Road SB Ramps												
	Existing	0	0	0	0	0	0	0	0	0	0	0	0
	2015	1	2		1.5		1.5		2	1			
	Post 2030 Constraint												
	Post 2030 MPAH												
445	Tustin Ranch Road at Warner Avenue North												
	Existing	0	0	0	0	0	0	0	0	0	0	0	0
	2015	2	3		2.5		1.5		2.5	1.5			
	Post 2030 Constraint												
	Post 2030 MPAH												
446	Tustin Ranch Road at Warner Avenue South												
	Existing	0	0	0	0	0	0	0	0	0	0	0	0
	2015		3	2				2	3		2		1
	Post 2030 Constraint												
	Post 2030 MPAH												
447	Armstrong Avenue/Severyns Road at Valencia Avenue												
	Existing	0	0	0	0	0	0	0	0	0	0	0	0
	2015	1	1		2	2		2	1	8	1	2	1
	Post 2030 Constraint												
	Post 2030 MPAH												
448	Armstrong Avenue at Warner Avenue												
	Existing	0	0	0	0	0	0	0	0	0	0	0	0
	2015	1	2	1	1	3	1	2	2		1	3	1
	Post 2030 Constraint												
	Post 2030 MPAH												
453	Red Hill Avenue at Valencia Avenue												
	Existing	1	3	0	1	1	0	1	3	0	1	1	1
	2015	2		1	2	2	1	2		1		2	
	Post 2030 Constraint												
	Post 2030 MPAH		4						4				
454	Tustin Ranch Road at Valencia Avenue												
	Existing	0	0	0	0	0	0	0	0	0	0	0	0
	2015	2	3	1	1	2	1	2	3	1	2	1	1
	Post 2030 Constraint												
	Post 2030 MPAH												
455	East Connector-Jamboree Plaza at Edinger Avenue												
	Existing	0	0	0	0	0	0	0	0	0	0	0	0
	2015	1	1	1	1	3	1	1	1	1	1	3	
	Post 2030 Constraint												
	Post 2030 MPAH												

IBC Vision Plan Intersection Lane Configurations

456	North Loop Road at Valencia Avenue												
	Existing	0	0	0	0	0	0	0	0	0	0	0	0
	2015		1	1				1	1		1		1
	Post 2030 Constraint												
	Post 2030 MPAH												
457	North Loop Road at Moffett Drive												
	Existing	0	0	0	0	0	0	0	0	0	0	0	0
	2015	1	2		1		1		2	1			
	Post 2030 Constraint												
	Post 2030 MPAH												
472	Obsidian at Michelson Drive												
	Existing	0	1	9	1	2	9	0	1	0	1	2	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
478	Red Hill Avenue at I-5 NB Ramps												
	Existing	0	3	1	1.5	0.5	1	1	3	0	0	0	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
479	Red Hill Avenue at I-5 SB Ramps												
	Existing	1	3	0	0	0	0	0	4	1	0.5	0.5	1
	2015												
	Post 2030 Constraint		4										
	Post 2030 MPAH												
480	Tustin Ranch Road Connector at Edinger Avenue												
	Existing	0	0	0	0	0	0	0	0	0	0	0	0
	2015				2	3		1		1		3	1
	Post 2030 Constraint												
	Post 2030 MPAH												
541	Bear Street at Baker Street												
	Existing	2	1	2	1	2	1	1	1	0	2	2	0
	2015												
	Post 2030 Constraint					3							
	Post 2030 MPAH												
542	Bear Street at Paularino Avenue												
	Existing	1	3	0	1	1	1	1	3	0	1	1	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
543	Bristol Street at Segerstrom Avenue												
	Existing	1	3	0	1	2	0	1	3	8	1	2	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
544	Bristol Street at MacArthur Boulevard												
	Existing	2	3	0	2	3	1	2	3	1	2	3	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												

IBC Vision Plan Intersection Lane Configurations

545	Bristol Street at Sunflower Avenue												
	Existing	2	3	1	2	3	1	2	2.5	1.5	2	2.5	1.5
	2015								3	1			
	Post 2030 Constraint					4	8	3	2.5	1.5			
	Post 2030 MPAH												
546	Bristol Street at Anton Boulevard												
	Existing	2	4	1	3	1	1	2	4	9	1	1	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
547	Bristol Street and Paularino Avenue												
	Existing	2	3	0	1	1	1	1	3	0	1	1	0
	2015												
	Post 2030 Constraint				2			2	4				1
	Post 2030 MPAH												
548	Bristol Street at Baker Street												
	Existing	2	3	1	2	2	1	2	3	1	2	2	0
	2015												
	Post 2030 Constraint					3			4		3	3	
	Post 2030 MPAH												
549	Newport Boulevard SB at Bristol Street												
	Existing	0	3	8	0	0	0	2	3	0	0	0	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
550	Newport Boulevard NB at Bristol Street												
	Existing	0	3	0	0	0	0	0	3	0	1.5	0	1.5
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
715	Bristol Street at I-405 NB Off Ramps												
	Existing	0	5	0	1.5	1.5	2	0	4	0	0	0	2
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
716	Bristol Street at I-405 SB Off Ramps												
	Existing	0	3	9	0	0	0	1	4	0	3	0	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
717	Bear Street at SR-73 SB Ramps												
	Existing	2	2	0	0	0	0	0	2	0	1.5	0	0.5
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
718	Bear Street at SR-73 NB Ramps												
	Existing	0	3	0	1	0	2	1	2	0	0	0	0
	2015												
	Post 2030 Constraint							2					
	Post 2030 MPAH												

IBC Vision Plan Intersection Lane Configurations

719	Flower Street at Segerstrom Avenue												
	Existing	1	2	0	1	2	0	1	2	0	1	2	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
720	Flower Street at MacArthur Boulevard												
	Existing	1	2	0	1	3	0	1	2	0	1	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
721	Flower Street at Sunflower Avenue												
	Existing	1	2	0	2	3	0	1	2	1	2	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
722	Anton Boulevard at Sunflower Avenue												
	Existing	0	0	0	1	3	0	1	0	2	0	3	0
	2015												
	Post 2030 Constraint				2								
	Post 2030 MPAH												
723	Main Street at Segerstrom Avenue												
	Existing	1	3	0	1	2	1	1	2	1	1	2	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
724	Main Street at Alton Avenue												
	Existing	1	3	0	0.5	0.5	1	1	3	0	0	0	0
	2015											1	
	Post 2030 Constraint											0	
	Post 2030 MPAH												
725	Main Street and MacArthur Boulevard (w/o SR-55)												
	Existing	2	3	1	2	3	1	2	3	1	2	3	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
726	Main Street at Sunflower Avenue												
	Existing	1	2	1	0	0	0	2	3	0	1.5	0.5	2
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
727	Halladay Street at Dyer Road												
	Existing	1	1	0	1	3	0	1	1	0	1	3	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
728	Halladay Street East at Alton Parkway												
	Existing	0.5	0.5	0	1	1	1	0	1	0	1	1	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												

IBC Vision Plan Intersection Lane Configurations

729	Halladay Street West at Alton Parkway												
	Existing	0	0	0	0.5	0.5	0	0.5	0.5	0	0	1	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
730	Grand Avenue at Warner Avenue												
	Existing	1	3	0	2	2	1	1	3	0	2	3	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
731	Grand Avenue at SR-55 SB Ramps												
	Existing	0	3	0	1	0	1	0	2	0	0	0	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
732	SR-55 NB Ramps/Del Amo Avenue at Newport Avenue												
	Existing	1	2	1	1	2	0	2	3	0	2	1.5	0.5
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
733	Irvine Avenue at Mesa Drive												
	Existing	1	2	8	1	1	1	1	2	8	1	1	0
	2015												
	Post 2030 Constraint		3		2				3				1
	Post 2030 MPAH												
734	Irvine Avenue at University Drive/Del Mar Avenue												
	Existing	1	2	1	1	1	8	1	2	1	1	1	1
	2015												
	Post 2030 Constraint		3						3		1.5	0.5	
	Post 2030 MPAH												
735	Newport Boulevard NB at Del Mar Avenue												
	Existing	0	0	0	0	2	1	0.5	2.5	8	2	2	0
	2015									1			
	Post 2030 Constraint					1.5	1.5	0	3				
	Post 2030 MPAH												
736	Newport Boulevard SB at Fair Drive/Del Mar Avenue												
	Existing	1	3	9	1	2	0	0	0	0	0	4	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
737	Newport Boulevard NB at Mesa Road												
	Existing	0	0	0	0	1	0	1	2	8	2	1	0
	2015									0			
	Post 2030 Constraint												
	Post 2030 MPAH												
738	Newport Boulevard SB at Mesa Road												
	Existing	1	4	1	1	1	0	0	0	0	0	1	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												

IBC Vision Plan Intersection Lane Configurations

739	Newport Avenue at Mitchell Avenue												
	Existing	1	2	8	0.5	0.5	1	1	2	8	0.5	0.5	1
	2015		3	0	1	1	0		3	0	1	1	0
	Post 2030 Constraint												
	Post 2030 MPAH												
740	Red Hill Avenue at Mitchell Avenue												
	Existing	1	2	1	0.5	0.5	1	1	2	1	0.5	0.5	1
	2015		3	0					3	0			
	Post 2030 Constraint												
	Post 2030 MPAH												
741	Jamboree Road at San Joaquin Hills Road												
	Existing	2	3	1	1.5	1.5	1	1	3	9	1.5	1.5	9
	2015			9									
	Post 2030 Constraint				2	1							
	Post 2030 MPAH												
742	MacArthur Boulevard at San Joaquin Hills Road												
	Existing	2	3	9	1	2	9	2	3	1	2	3	0
	2015												
	Post 2030 Constraint	3							4	0	3		
	Post 2030 MPAH												
743	Newport Avenue at Valencia Avenue												
	Existing												
	2015	2	1	8	1	1	2	1	1	8	1	1	8
	Post 2030 Constraint												
	Post 2030 MPAH												
745	Tustin Ranch Road at Park Avenue												
	Existing	2	3	8	2	0	1	1	3	1	0	0	0
	2015			1	1	1		2			2	2	1
	Post 2030 Constraint												
	Post 2030 MPAH												
746	Kensington Park Drive at Edinger Avenue												
	Existing												
	2015	0	0	0	2	3	0	2	0	1	0	3	1
	Post 2030 Constraint												
	Post 2030 MPAH												
747	Kensington Park Drive at Valencia Avenue												
	Existing												
	2015	2	0	2	0	2	1	0	0	0	2	2	0
	Post 2030 Constraint												
	Post 2030 MPAH												
748	Armstrong Avenue at A Street												
	Existing												
	2015	1	2	8	1	1	8	1	2	8	2	1	8
	Post 2030 Constraint												
	Post 2030 MPAH												
749	Park Avenue at A Street												
	Existing												
	2015	1	1	8	1	2	8	2	1	8	1	2	8
	Post 2030 Constraint												
	Post 2030 MPAH												

IBC Vision Plan Intersection Lane Configurations

750	Legacy Road at Warner Avenue												
	Existing												
	2015	1	2	1	2	3	1	1	2	1	2	3	1
	Post 2030 Constraint												
	Post 2030 MPAH												
751	Tustin Ranch Road at Legacy Road												
	Existing												
	2015	2	3	1	1	2	1	2	3	1	1	2	1
	Post 2030 Constraint												
	Post 2030 MPAH												
752	Legacy Road at North Loop Road												
	Existing												
	2015	1	2	8	1	1	8	1	2	8	1	1	1
	Post 2030 Constraint												
	Post 2030 MPAH												
753	Tustin Ranch Road at Edinger Avenue Connector												
	Existing												
	2015	1	3	0	2	0	1	0	3	1	0	0	0
	Post 2030 Constraint												
	Post 2030 MPAH												
754	Red Hill Avenue at Carnegie Avenue/A Street												
	Existing	0	3	0	0	0	0	1	3	0	1	1	0
	2015	2		8	1	0.5	1.5			1			1
	Post 2030 Constraint												
	Post 2030 MPAH		4						4				

Hines improvements under WP scenarios.

Note: Intersection #119: Teller Avenue at Michelson Drive--Hines Improvements under WP scenarios (2 NBL, 1 NBT, 0 NBR)

Intersection #145: Jamboree Road at Michelson Drive--Hines Improvements under WP scenarios (Add EBR to all WP scenarios)

Intersection #146: Jamboree Road at Dupont Road--Hines Improvements under WP scenarios (2 EBL, 1 EBT, 0 EBR)

8 = defacto right-turn lane

9 = freeflow right-turn lane

11 = single lane right-turn overlap

12 = double lane right-turn overlap

negative = split phase

Appendix F ICU Worksheets for Mitigation Intersections

Appendix F-1 **ICU Worksheets for 2015 Cumulative Baseline With Project Mitigation Strategies**

Appendix F-2 **ICU Worksheets for Post-2030 Cumulative Baseline With Project Mitigation Strategies**

Appendix F-1 ICU Worksheets for 2015 Cumulative Baseline With Project Mitigation Strategies

Source:V:\2015-FutureConditions\Traffic Model\CumulativeBaselineWProj\ITAM3-IBCVP-2015WP-101509\EXE\ICU\Y15WP-IRV01-102909-MIT.RPT

134 . Loop Rd. at Warner Av.

Y2015 WITH Project (IRVINE ISEC)
Add 3rd EBT

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	29	.02	66	.04
NBT	1	1700	10	.01*	192	.11*
NBR	1	1700	110	.06	469	.28
SBL	1	1700	143	.08*	198	.12*
SBT	2	3400	153	.05	323	.10
SBR	1	1700	927	.55	238	.14
EBL	1	1700	31	.02*	33	.02
EBT	3	5100	565	.11	1800	.35*
EBR	1	1700	68	.04	30	.02
WBL	2	3400	143	.04	295	.09*
WBT	2	3400	701	.21*	437	.13
WBR	1	1700	9	.01	22	.01
Right Turn Adjustment			SBR	.46*	NBR	.10*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.83		.82

145 . Jamboree Rd. at Michelson Dr.

Y2015 WITH Project (IRVINE ISEC)
Add 3rd EBL, 3rd SBL

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	154	.09*	66	.04
NBT	4	6800	1405	.21	2372	.35*
NBR	1	1700	180	.11	561	.33
SBL	3	5100	609	.12	1114	.22*
SBT	4	6800	2677	.39*	2006	.29
SBR	f		526		421	
EBL	3	5100	252	.05*	1055	.21*
EBT	2	3400	202	.06	384	.11
EBR	1	1700	76	.04	171	.10
WBL	2	3400	407	.12	314	.09
WBT	2	3400	510	.15*	263	.08*
WBR	f		613		704	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.73		.91

Source:V:\2015-FutureConditions\Traffic Model\CumulativeBaselineWProj\ITAM3-IBCVP-2015WP-101509\EXE\ICU\Y15WP-NPB01-102909-MIT.RPT

62 . Campus Dr. at Bristol St. NB

Y2015 WITH Project (NEWPORT BEACH ISEC)
Add Post-2030 Improvement of 5th WBT

			AM PK HOUR		PM PK HOUR	
	LANES	CAPACITY	VOL	V/C	VOL	V/C
NBL	2	3200	700	.22	834	.26*
NBT	3	4800	1849	.39*	696	.15
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6400	359	.06	901	.14*
SBR	2	3200	352	.11	1009	.32
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	253	.16	289	.18
WBT	5	8000	1192	.18*	2087	.27*
WBR	0	0	256		104	
Right Turn Adjustment					SBR	.18*
TOTAL CAPACITY UTILIZATION				.57		.85

Source:V:\2015-FutureConditions\Traffic Model\CumulativeBaselineWProj\ITAM3-IBCVP-2015WP-101509\EXE\ICU\Y15WP-TUS01-102909-MIT.RPT

36 . Red Hill Av. at El Camino Real

Y2015 WITH Project (TUSTIN ISEC)
Reconfigure SB to 1.5.2.5.0

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	233	.07*	368	.11
NBT	3	5100	659	.13	804	.16*
NBR	1	1700	188	.11	395	.23
SBL	1.5		92	.05	305	{.14}*
SBT	2.5	6800	1285	.26*	593	.14
SBR	0		43		49	
EBL	1	1700	90	.05	26	.02
EBT	1.5	5100	249	{.08}*	990	.29*
EBR	1.5		252		135	
WBL	1.5		480	{.16}*	392	{.23}*
WBT	1.5	5100	243	.16	953	.30
WBR	0		76		171	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .62 .87

93 . Tustin Ranch Rd. at El Camino Real

Y2015 WITH Project (TUSTIN ISEC)
Add 4th SBT, Restripe EB to 1 0.5 1.5

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	132	.04*	526	.15
NBT	3	5100	513	.10	2508	.49*
NBR	d	1700	118	.07	336	.20
SBL	2	3400	76	.02	147	.04*
SBT	4	6800	2735	.40*	858	.13
SBR	d	1700	123	.07	55	.03
EBL	1	1700	132	.08	82	.05
EBT	0.5	3400	127	{.18}*	287	.17*
EBR	1.5		523		191	
WBL	1	1700	281	.17*	251	.15*
WBT	2	3400	165	.05	389	.11
WBR	1	1700	85	.05	330	.19
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .84 .90

111 . Franklin Av. at Walnut Av.

Y2015 WITH Project (TUSTIN ISEC)
Add 3rd WBT lane

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	85	.05*	248	.15*
NBT	2	3400	10	.01	11	.01
NBR	0	0	18	.01	12	.01
SBL	1	1700	45	.03	63	.04
SBT	2	3400	13	.01*	11	.01*
SBR	0	0	159	.09	527	.31
EBL	1	1700	443	.26*	248	.15*
EBT	2	3400	947	.28	640	.19
EBR	d	1700	347	.20	140	.08
WBL	1	1700	70	.04	12	.01
WBT	3	5100	496	.10*	1508	.30*
WBR	d	1700	157	.09	68	.04
Right Turn Adjustment					SBR	.19*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .47 .85

Source:V:\2015-FutureConditions\Traffic Model\CumulativeBaselineWProj\ITAM3-IBCVP-2015WP-101509\EXE\ICU\Y15WP-TUS02-102909-MIT.RPT

732 . Newport Av. at SR-55 NB Ramps

Y2015 WITH Project (TUSTIN ISEC)
Reconfigure SB to 1.1.5.1.5

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	81	.02*	421	.12*
NBT	3	5100	329	.10	733	.16
NBR	0	0	212	.12	102	
SBL	1	1700	0	.00	41	.02
SBT	1.5	5100	886	{.26}*	325	.19*
SBR	1.5		499	{.19}	1068	.31
EBL	2	3400	470	.14*	405	.12*
EBT	1.5	3400	365	.11	49	.03
EBR	0.5		24		39	
WBL	1	1700	30	.02	82	.05
WBT	2	3400	105	.04*	218	.08*
WBR	0	0	19		39	
Right Turn Adjustment					SBR	.03*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.51		.59

Appendix F-2 **ICU Worksheets for Post-2030 Cumulative Baseline With Project Mitigation Strategies**

10 . SR-55 Frontage Rd. SB at Paularino Av.

P2030 Constraint With Project (COSTA MESA ISEC)
Improve SB to 1.5,1.0.5

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		788		174	
SBT	1	4800	970	.41*	725	.25*
SBR	0.5		197		300	
EBL	0	0	0		0	
EBT	2	3200	1122	.40*	526	.20*
EBR	0	0	172		108	
WBL	1	1600	118	.07*	306	.19*
WBT	2	3200	233	.07	860	.27
WBR	0	0	0		0	

TOTAL CAPACITY UTILIZATION .88 .64

12 . SR-55 Frontage Rd. SB at Baker St.

P2030 Constraint With Project (COSTA MESA ISEC)
Improve SB to 1.5,1.5,1. Restripe EB to 0.2.5,0.5

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	0	0	0		0	
NBR	0	0	0		0	
SBL	1.5		836	.26*	279	
SBT	1.5	4800	149	.09	383	.14*
SBR	1	1600	215	.13	518	.32
EBL	0	0	0		0	
EBT	2.5	4800	1964	.46*	821	.26*
EBR	0.5		262		551	.34
WBL	1	1600	99	.06*	357	.22*
WBT	2	3200	495	.15	1412	.44
WBR	0	0	0		0	
Right Turn Adjustment					Multi	.23*

TOTAL CAPACITY UTILIZATION .78 .85

13 . SR-55 Frontage Rd. NB at Baker St.

P2030 Constraint With Project (COSTA MESA ISEC)
Restripe EB to 1.3.0. Add defacto NBR

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1.5		399	{.17}*	375	{.18}*
NBT	1.5	4800	436	.17	474	.18
NBR	d	1600	615	.38	502	.31
SBL	0	0	0		0	
SBT	0	0	0		0	
SBR	0	0	0		0	
EBL	1	1600	705	.44*	343	.21*
EBT	3	4800	2055	.43	688	.14
EBR	0	0	0		0	
WBL	0	0	0		0	
WBT	2	3200	271	.08*	1435	.45*
WBR	1	1600	188	.12	673	.42
Right Turn Adjustment			Multi	.18*		

TOTAL CAPACITY UTILIZATION .87 .84

Source:V:\2030P-FutureConditions\Traffic Model\CumulativeBaseline\wProj\MitStrategiesIBCUpdate-P2030\EXE\ICU\P30WP-C-IRV01-102909-MIT.

134 . Loop Rd. at Warner Av.

P2030 Constraint With Project (IRVINE ISEC)
Add 3rd EBT

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	29	.02	76	.04
NBT	2	3400	9	.00*	201	.06*
NBR	1	1700	110	.06	425	.25
SBL	1	1700	161	.09*	196	.12*
SBT	2	3400	128	.04	263	.08
SBR	f		1042		302	
EBL	2	3400	49	.01*	46	.01
EBT	3	5100	919	.18	2132	.42*
EBR	1	1700	82	.05	29	.02
WBL	2	3400	140	.04	346	.10*
WBT	2	3400	919	.27*	797	.23
WBR	1	1700	12	.01	36	.02
Right Turn Adjustment					NBR	.11*
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.42		.86

136 . Jamboree Rd. at Barranca Pkwy.

P2030 Constraint With Project (IRVINE ISEC)
Convert free NBR to standard right-turn. Add 5th NBT

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	236	.07*	270	.08
NBT	5	8500	1372	.16	3147	.37*
NBR	1	1700	175	.10	263	.15
SBL	2	3400	429	.13	406	.12*
SBT	4	6800	3148	.46*	1823	.27
SBR	f		1119		388	
EBL	2.5		202	.06	1138	
EBT	2.5	8500	657	.13*	831	.23*
EBR	1	1700	101	.06	142	.08
WBL	2	3400	244	.07	305	.09
WBT	3	5100	797	.16*	942	.18*
WBR	f		208		525	
Clearance Interval				.05*		.05*

Note: Assumes E/W Split Phasing

TOTAL CAPACITY UTILIZATION .87 .95

141 . Jamboree Rd. at Main St.

P2030 Constraint With Project (IRVINE ISEC)
Improve NB & SB to 2.5.1. Change WB free right to WBR

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	705	.21*	593	.17*
NBT	5	8500	1825	.21	2938	.35
NBR	1	1700	216	.13	465	.27
SBL	2	3400	487	.14	345	.10
SBT	5	8500	2718	.32*	2495	.29*
SBR	1	1700	667	.39	235	.14
EBL	2	3400	162	.05	570	.17
EBT	3	5100	327	.06*	1250	.25*
EBR	f		302		799	
WBL	2	3400	691	.20*	596	.18*
WBT	3	5100	718	.14	412	.08
WBR	1	1700	103	.06	352	.21
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .84 .94

145 . Jamboree Rd. at Michelson Dr.

P2030 Constraint With Project (IRVINE ISEC)
Add 3rd EBL, 3rd SBL, and WBT

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	156	.09*	75	.04
NBT	4	6800	1516	.22	2574	.38*
NBR	f		267		601	
SBL	3	5100	923	.18	1285	.25*
SBT	4	6800	2796	.41*	2193	.32
SBR	f		541		512	
EBL	3	5100	327	.06	1106	.22*
EBT	2	3400	360	.11*	397	.12
EBR	1	1700	94	.06	167	.10
WBL	2	3400	440	.13*	422	.12
WBT	3	5100	543	.11	393	.08*
WBR	f		697		1014	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .79 .98

188 . Harvard Av. at Michelson Dr.

P2030 Constraint With Project (IRVINE ISEC)
Add 2nd SBL

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	131	.08*	121	.07
NBT	2	3400	311	.10	1031	.34*
NBR	0	0	29		110	
SBL	2	3400	152	.04	314	.09*
SBT	2	3400	874	.26*	641	.19
SBR	1	1700	528	.31	359	.21
EBL	2	3400	174	.05*	469	.14*
EBT	2	3400	348	.10	976	.29
EBR	f		90		157	
WBL	1	1700	137	.08	92	.05
WBT	2	3400	741	.26*	501	.20*
WBR	0	0	145		169	
Right Turn Adjustment			SBR	.01*		
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .71 .82

232 . Culver Dr. at I-405 NB Ramps

P2030 Constraint With Project (IRVINE ISEC)
Restripe WB to 1.5.0.1.5

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	0	0	0		0	
NBT	3	5100	849	.17	2175	.43*
NBR	f		560		400	
SBL	0	0	0		0	
SBT	3	5100	1340	.26*	1291	.25
SBR	f		930		690	
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1.5		850	.25*	469	
WBT	0	5100	0		0	.25*
WBR	1.5		521	{.24}	805	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.56		.73

Source:V:\2030P-FutureConditions\Traffic Model\CumulativeBaseline\wProj\MitStrategiesIBCUpdate-P2030\EXE\ICU\P30WP-C-COM01-102909-MIT.

62 . Campus Dr. at Bristol St. NB

P2030 Constraint With Project (NEWPORT BEACH IS
Add 3rd SBT lane

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3200	618	.19	765	.24*
NBT	3	4800	2259	.47*	776	.16
NBR	0	0	0		0	
SBL	0	0	0		0	
SBT	4	6400	293	.05	1044	.16*
SBR	3	4800	457	.10	1196	.25
EBL	0	0	0		0	
EBT	0	0	0		0	
EBR	0	0	0		0	
WBL	1	1600	207	.13	346	.22
WBT	5	8000	1555	.24*	2550	.34*
WBR	0	0	461	.29	154	
Right Turn Adjustment			WBR	.05*	SBR	.09*

TOTAL CAPACITY UTILIZATION .76 .83

85 . MacArthur Bl. at Birch St.

P2030 Constraint With Project (NEWPORT BEACH IS
Improve EB to 2 EBL and 2 EBT

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1600	55	.03	132	.08*
NBT	3	4800	1750	.36*	1230	.26
NBR	f		108		53	
SBL	1	1600	163	.10*	180	.11
SBT	4	6400	848	.17	2260	.39*
SBR	0	0	223		213	
EBL	2	3200	176	.06	302	.09*
EBT	2	3200	549	.20*	497	.16
EBR	0	0	86		24	
WBL	1	1600	56	.04*	136	.09
WBT	2	3200	502	.16	1046	.33*
WBR	f		124		188	

TOTAL CAPACITY UTILIZATION .70 .89

Source:V:\2030P-FutureConditions\Traffic Model\CumulativeBaseline\wProj\MitStrategiesIBCUpdate-P2030\EXE\ICU\P30WP-C-SAN02-102909-MIT.

543 . Bristol St. at Segerstrom Av.

P2030 Constraint With Project (SANTA ANA ISEC)
Alt 1: Add 3rd EBT and WBT lanes

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	98	.06*	226	.13
NBT	3	5100	856	.17	1382	.27*
NBR	d	1700	238	.14	381	.22
SBL	1	1700	263	.15	185	.11*
SBT	3	5100	1292	.28*	1004	.22
SBR	0	0	120		112	
EBL	1	1700	256	.15	267	.16
EBT	3	5100	1180	.25*	997	.26*
EBR	0	0	96		306	
WBL	1	1700	213	.13*	272	.16*
WBT	3	5100	812	.18	1165	.25
WBR	0	0	99		124	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.77		.85

543 . Bristol St. at Segerstrom Av.

P2030 Constraint With Project (SANTA ANA ISEC)
Alt 2: Add 4th NBT and SBT lanes

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	98	.06	226	.13
NBT	4	6800	856	.13*	1382	.20*
NBR	d	1700	238	.14	381	.22
SBL	1	1700	263	.15*	185	.11*
SBT	4	6800	1292	.21	1004	.16
SBR	0	0	120		112	
EBL	1	1700	256	.15	267	.16*
EBT	2	3400	1180	.38*	997	.38
EBR	0	0	96		306	
WBL	1	1700	213	.13*	272	.16
WBT	2	3400	812	.27	1165	.38*
WBR	0	0	99		124	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.84		.90

Source:V:\2030P-FutureConditions\Traffic Model\CumulativeBaseline\wProj\MitStrategiesIBCUpdate-P2030\EXE\ICU\P30WP-C-SAN02-102909-MIT.

723 . Main St. at Dyer Rd.

P2030 Constraint With Project (SANTA ANA ISEC)
Add 3rd NBT, defacto NBR

			AM PK HOUR		PM PK HOUR	
	LANES	CAPACITY	VOL	V/C	VOL	V/C
NBL	1	1700	94	.06*	222	.13
NBT	3	5100	498	.10	1224	.24*
NBR	d	1700	219	.13	412	.24
SBL	1	1700	209	.12	90	.05*
SBT	3	5100	1153	.26*	648	.16
SBR	0	0	192		183	
EBL	1	1700	245	.14	199	.12*
EBT	2	3400	1283	.38*	728	.21
EBR	1	1700	273	.16	112	.07
WBL	1	1700	184	.11*	210	.12
WBT	2	3400	934	.27	1125	.33*
WBR	1	1700	107	.06	158	.09
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.86		.79

730 . Grand Av. at Warner Av.

P2030 Constraint With Project (SANTA ANA ISEC)
Add 3rd WBT

			AM PK HOUR		PM PK HOUR	
	LANES	CAPACITY	VOL	V/C	VOL	V/C
NBL	1	1700	172	.10	262	.15
NBT	3	5100	617	.18*	640	.16*
NBR	0	0	331	.19	198	
SBL	1	1700	373	.22*	308	.18*
SBT	3	5100	539	.16	522	.15
SBR	0	0	278	.16	311	.18
EBL	2	3400	488	.14	477	.14*
EBT	3	5100	1546	.30*	1027	.20
EBR	1	1700	217	.13	178	.10
WBL	2	3400	195	.06*	261	.08
WBT	3	5100	820	.16	1470	.29*
WBR	1	1700	294	.17	497	.29
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.81		.82

3 . Newport Av. at Edinger Av.

P2030 Constraint With Project (TUSTIN ISEC)
Convert SBR to Free Right turn lane

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	430	.13*	627	.18*
NBT	3	5100	234	.05	783	.15
NBR	d	1700	117	.07	101	.06
SBL	2	3400	192	.06	48	.01
SBT	3	5100	888	.17*	405	.08*
SBR	f		741		317	
EBL	2	3400	321	.09	743	.22*
EBT	3	5100	1451	.28*	852	.17
EBR	1	1700	730	.43	781	.46
WBL	1	1700	172	.10*	196	.12
WBT	3	5100	1289	.25	1370	.27*
WBR	f		85		186	
Right Turn Adjustment			EBR	.02*		
Clearance Interval				.05*		.05*

Note: Assumes Right-Turn Overlap for EBR

TOTAL CAPACITY UTILIZATION .75 .80

24 . Newport Av. at Walnut Av.

P2030 Constraint With Project (TUSTIN ISEC)
Add Defacto NBR and defacto WBR turn lane

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	45	.03	152	.09
NBT	3	5100	732	.14*	1131	.22*
NBR	d	1700	96	.06	157	.09
SBL	1	1700	738	.43*	560	.33*
SBT	3	5100	1109	.23	699	.15
SBR	0	0	46		59	
EBL	1	1700	122	.07	43	.03
EBT	2	3400	426	.18*	424	.15*
EBR	0	0	173		92	
WBL	1	1700	158	.09*	161	.09*
WBT	2	3400	339	.10	490	.14
WBR	d	1700	376	.22	639	.38
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .89 .84

93 . Tustin Ranch Rd. at El Camino Real

P2030 Constraint With Project (TUSTIN ISEC)
Add 4th SBT, Restripe EB to 1 0.5 1.5

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	2	3400	123	.04*	548	.16
NBT	3	5100	429	.08	2238	.44*
NBR	d	1700	119	.07	302	.18
SBL	2	3400	106	.03	168	.05*
SBT	4	6800	2544	.37*	810	.12
SBR	d	1700	158	.09	72	.04
EBL	1	1700	167	.10	102	.06
EBT	0.5	3400	196	{.20}*	360	.21*
EBR	1.5		538		199	
WBL	1	1700	262	.15*	222	.13*
WBT	2	3400	211	.09	480	.24
WBR	0	0	97		350	
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .81 .88

111 . Franklin Av. at Walnut Av.

P2030 Constraint With Project (TUSTIN ISEC)
Add 3rd WBT lane

	LANES	CAPACITY	AM PK HOUR VOL	AM PK HOUR V/C	PM PK HOUR VOL	PM PK HOUR V/C
NBL	1	1700	97	.06*	246	.14*
NBT	2	3400	8	.00	11	.01
NBR	0	0	16	.01	14	.01
SBL	1	1700	37	.02	65	.04
SBT	2	3400	9	.01*	9	.01*
SBR	0	0	166	.10	457	.27
EBL	1	1700	406	.24*	235	.14*
EBT	2	3400	1037	.31	745	.22
EBR	d	1700	332	.20	131	.08
WBL	1	1700	69	.04	13	.01
WBT	3	5100	706	.14*	1632	.32*
WBR	d	1700	146	.09	70	.04
Right Turn Adjustment					SBR	.15*
Clearance Interval				.05*		.05*

TOTAL CAPACITY UTILIZATION .50 .81

Source:V:\2030P-FutureConditions\Traffic Model\CumulativeBaseline\wProj\MitStrategiesIBCUpdate-P2030\EXE\ICU\P30WP-C-TUS02-102909-MIT.
754 . Red Hill Ave. at Carnegie

P2030 Constraint With Project (TUSTIN ISEC)
Add 4th NBT

			AM PK HOUR		PM PK HOUR	
	LANES	CAPACITY	VOL	V/C	VOL	V/C
NBL	1	1700	109	.06*	26	.02
NBT	4	6800	703	.10	2465	.36*
NBR	1	1700	315	.19	285	.17
SBL	2	3400	555	.16	273	.08*
SBT	3	5100	1324	.26*	781	.15
SBR	d	1700	121	.07	11	.01
EBL	1	1700	10	.01*	142	.08
EBT	1	1700	90	.05	325	.19*
EBR	1	1700	8	.00	61	.04
WBL	1	1700	146	.09	252	.15*
WBT	0.5	3400	411	.24*	162	{.17}
WBR	1.5		194		502	
Clearance Interval				.05*		.05*
TOTAL CAPACITY UTILIZATION				.62		.83

Appendix G Improvement Strategies

IBC Vision Plan Intersection Lane Configurations and Improvement Strategies

Loc #	Intersection (NS at EW)	Intersection Approach Lanes											
		Southbound			Westbound			Northbound			Eastbound		
		L	T	R	L	T	R	L	T	R	L	T	R
3	Newport Avenue at Edinger Avenue												
	Existing	0	0	0	1	3	0	2	0	1	0	3	11
	2015									2			
	Post 2030 Constraint	2	3	1			9		3	8	2		
	Post 2030 MPAH												
Cumulative	Post-2030 Proposed Improvement Strategy			9									
10	SR-55 Frontage Road SB Ramps at Paularino												
	Existing	0	2	0	1	2	0	0	0	0	0	2	0
	2015												
	Post 2030 Constraint			1									
	Post 2030 MPAH												
Cumulative	Post-2030 Proposed Improvement Strategy	1.5	1	0.5									
12	SR-55 SB Frontage Road at Baker Street												
	Existing	0	2	0	1	2	0	0	0	0	0	2	1
	2015												
	Post 2030 Constraint			1								1.5	1.5
	Post 2030 MPAH												
Project	Post-2030 Proposed Improvement Strategy	1.5	1.5	1							0	2.5	0.5
13	SR-55 NB Frontage Road at Baker Street												
	Existing	0	0	0	0	2	1	0	2	0	1	2	0
	2015												
	Post 2030 Constraint							1.5	1.5		2		
	Post 2030 MPAH												
Project	Post-2030 Proposed Improvement Strategy									8	1	3	0
24	Newport Avenue at Walnut Avenue												
	Existing	1	2	8	1	2	0	1	2	8	1	2	0
	2015		3	0					3	0			
	Post 2030 Constraint												
	Post 2030 MPAH												
Project	Post-2030 Proposed Improvement Strategy						8			8			

IBC Vision Plan Intersection Lane Configurations and Improvement Strategies

36	Red Hill Avenue at El Camino Real												
	Existing	1	3	0	1	1	0	2	3	1	1	1	1
	2015				1.5	1.5						1.5	1.5
Cumulative	2015 Proposed Improvement Strategy (temporary deficiency in 2015)	1.5	2.5										
	Post 2030 Constraint												
	Post 2030 MPAH												
62	Campus Drive at Bristol Street NB												
	Existing	0	4	2	1	4	0	2	3	0	0	0	0
	2015												
Project	2015 Proposed Improvement Strategy (Apply Post-2030 Improvement)					5							
	Post 2030 Constraint					5							
	Post 2030 MPAH												
Project	Post-2030 Proposed Improvement Strategy			3									
85	MacArthur Boulevard at Birch Street												
	Existing	1	4	0	1	2	9	1	3	9	1.5	1.5	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
Project	Post-2030 Proposed Improvement Strategy										2	2	
93	Tustin Ranch Road at El Camino Real												
	Existing	2	3	8	1	2	0	2	3	8	1	2	0
	2015												
Project	2015 Proposed Improvement Strategy		4								1	0.5	1.5
	Post 2030 Constraint												
	Post 2030 MPAH												
Project	Post-2030 Proposed Improvement Strategy		4								1	0.5	1.5
111	Franklin Avenue at Walnut Avenue												
	Existing	1	2	0	1	2	8	1	2	0	1	2	8
	2015												
Cumulative	2015 Proposed Improvement Strategy					3							
	Post 2030 Constraint												
	Post 2030 MPAH												
Cumulative	Post-2030 Proposed Improvement Strategy					3							

IBC Vision Plan Intersection Lane Configurations and Improvement Strategies

134	Loop Road/Park Avenue at Warner Avenue												
	Existing	1	2	1	2	2	1	1	1	1	1	2	1
	2015												
Project	2015 Proposed Improvement Strategy											3	
	Post 2030 Constraint			9					2		2		
	Post 2030 MPAH												
Project	Post-2030 Proposed Improvement Strategy											3	
136	Jamboree Road at Barranca Avenue												
	Existing	2	4	9	-2	-3	-9	2	4	9	-2.5	-2.5	-1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												-9
Project	Post-2030 Proposed Improvement Strategy								5	1			
141	Jamboree Road at Main Street												
	Existing	2	4	1	2	3	9	2	4	9	2	3	9
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH											4	
Project	Post-2030 Proposed Improvement Strategy		5				1		5				
145	Jamboree Road at Michelson Drive												
	Existing	2	4	9	2	2	9	1	4	1	2	2	0
	2015												
Project	2015 Proposed Improvement Strategy	3									3		
	Post 2030 Constraint									9			
	Post 2030 MPAH												1
Project	Post-2030 Proposed Improvement Strategy	3				3					3		
188	Harvard Avenue at Michelson Drive												
	Existing	1	2	1	1	2	0	1	2	0	2	2	9
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH			9									
Cumulative	Post-2030 Proposed Improvement Strategy	2											

IBC Vision Plan Intersection Lane Configurations and Improvement Strategies

232	Culver Drive at I-405 NB Ramps												
	Existing	0	3	9	2	0	1	0	3	9	0	0	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
Project	Post-2030 Proposed Improvement Strategy				1.5		1.5						
543	Bristol Street at Segerstrom Avenue												
	Existing	1	3	0	1	2	0	1	3	8	1	2	0
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
Project	Post-2030 Proposed Improvement Strategy (Alternative 1)					3						3	
Project	Post-2030 Proposed Improvement Strategy (Alternative 2)		4						4				
723	Main Street at Segerstrom Avenue												
	Existing	1	3	0	1	2	1	1	2	1	1	2	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
Project	Post-2030 Proposed Improvement Strategy								3	8			
730	Grand Avenue at Warner Avenue												
	Existing	1	3	0	2	2	1	1	3	0	2	3	1
	2015												
	Post 2030 Constraint												
	Post 2030 MPAH												
Project	Post-2030 Proposed Improvement Strategy					3							
732	SR-55 NB Ramps/Del Amo Avenue at Newport Avenue												
	Existing	1	2	1	1	2	0	2	3	0	2	1.5	0.5
	2015												
Cumulative	2015 Proposed Improvement Strategy (temporary deficiency in 2015)					3							
	Post 2030 Constraint												
	Post 2030 MPAH												

IBC Vision Plan Intersection Lane Configurations and Improvement Strategies

754	Red Hill Avenue at Carnegie Avenue/A Street												
	Existing	0	3	0	0	0	0	1	3	0	1	1	0
	2015	2		8	1	0.5	1.5			1			1
	Post 2030 Constraint												
	Post 2030 MPAH		4						4				
Project	Post-2030 Proposed Improvement Strategy								4				

	Hines improvements under WP scenarios.
Note:	Intersection #145: Jamboree Road at Michelson Drive--Hines Improvements under WP scenarios (Add EBR to all WP scenarios)
Project	Project Related Significant Impact in either 2015 or Post-2030 (Project has fair share responsibility outside of Irvine, full responsibility in Irvine)
Cumulative	Cumulative deficiency in either 2015 or Post-2030 (No project responsibility)
8	= defacto right-turn lane
9	= freeflow right-turn lane
11	= single lane right-turn overlap
12	= double lane right-turn overlap
negative	= split phase

Appendix H Fair Share Analysis

2015 Cumulative With Project Fair Share Analysis

Year-2015 Cumulative Baseline Fair-Share Analysis (Newport Beach)

62	NB	Campus Drive at Bristol Street NB														
EXISTING NO PROJECT															Difference	Difference	Fair
	ICU	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR	TOTAL	From Existing	From No Project	Share
AM	0.58	0	247	241	203	957	230	633	1,873	0	0	0	0	4,384			
PM	0.86	0	845	913	284	1,975	77	811	530	0	0	0	0	5,435			
Year-2015 Cumulative Baseline NO PROJECT																	
AM	0.60	0	301	290	249	1,161	253	688	1,847	0	0	0	0	4,789	405		
PM	0.90	0	870	970	290	2,083	97	827	643	0	0	0	0	5,780	345		
Year-2015 Cumulative Baseline WITH PROJECT																	
AM	0.62	0	359	352	253	1,192	256	700	1,849	0	0	0	0	4,961	577	172	29.8%
PM	0.92	0	901	1,009	289	2,087	104	834	696	0	0	0	0	5,920	485	140	28.9%

Year-2015 Cumulative Baseline Fair-Share Analysis (Tustin)

93	Tus	Tustin Ranch Road at El Camino Real														
EXISTING NO PROJECT															Difference	Difference	Fair
	ICU	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR	TOTAL	From Existing	From No Project	Share
AM	0.90	61	2,141	72	230	101	58	100	433	122	100	118	475	4,011			
PM	0.69	112	630	45	223	388	282	471	1,919	278	54	205	132	4,739			
Year-2015 Cumuative Baseline NO PROJECT																	
AM	1.07	73	2,757	118	275	154	81	128	509	114	130	122	528	4,989	978		
PM	0.87	142	845	53	254	387	329	530	2,522	338	80	280	191	5,951	1,212		
Year-2015 Cumuative Baseline WITH PROJECT																	
AM	1.08	76	2,735	123	281	165	85	132	513	118	132	127	523	5,010	999	21	2.1%
PM	0.87	147	858	55	251	389	330	526	2,508	336	82	287	191	5,960	1,221	9	0.7%
134	Tus	Loop Road/Park Avenue at Warner Avenue														
EXISTING NO PROJECT															Difference	Difference	Fair
	ICU	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR	TOTAL	From Existing	From No Project	Share
AM	0.61	225	185	806	64	225	9	14	14	95	5	54	5	1,701			
PM	0.86	280	394	74	178	67	7	15	92	488	10	1,177	17	2,799			
Year-2015 Cumuative Baseline NO PROJECT																	
AM	0.83	138	162	923	147	678	9	30	10	109	31	558	74	2,869	1,168		
PM	1.00	197	325	236	299	435	19	65	176	474	30	1,783	31	4,070	1,271		
Year-2015 Cumuative Baseline WITH PROJECT																	
AM	0.83	143	153	927	143	701	9	29	10	110	31	565	68	2,889	1,188	20	1.7%
PM	1.00	198	323	238	295	437	22	66	192	469	33	1,800	30	4,103	1,304	33	2.5%

Post-2030 Cumulative With Project Fair Share Analysis

Post-2030 Cumulative Fair-Share Analysis (Costa Mesa)

12	CM	SR-55 SB Frontage Road at Baker Street															
EXISTING NO PROJECT															Difference	Difference	Fair
	ICU	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR	TOTAL	From Existing	From No Project	Share
AM	0.63	412	121	252	49	356	0	0	0	0	0	1,100	242	2,532			
PM	0.65	173	284	434	209	933	0	0	0	0	0	488	392	2,913			
POST-2030 Cumulative Baseline NO PROJECT																	
AM	1.18	826	150	214	98	486	0	0	0	0	0	1,924	262	3,960	1,428		
PM	0.70	271	368	501	349	1,389	0	0	0	0	0	799	532	4,209	1,296		
POST-2030 Cumulative Baseline WITH PROJECT																	
AM	1.19	836	149	215	99	495	0	0	0	0	0	1,964	262	4,020	1,488	60	4.0%
PM	0.72	279	383	518	357	1,412	0	0	0	0	0	821	551	4,321	1,408	112	8.0%

13	CM	SR-55 NB Frontage Road at Baker Street															
EXISTING NO PROJECT															Difference	Difference	Fair
	ICU	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR	TOTAL	From Existing	From No Project	Share
AM	0.69	0	0	0	0	169	116	307	332	288	527	945	0	2,684			
PM	0.74	0	0	0	0	799	318	385	413	272	261	325	0	2,773			
POST-2030 Cumulative Baseline NO PROJECT																	
AM	1.01	0	0	0	0	268	181	394	420	606	680	2,029	0	4,578	1,894		
PM	0.82	0	0	0	0	1,413	635	367	444	490	321	670	0	4,340	1,567		
POST-2030 Cumulative Baseline WITH PROJECT																	
AM	1.02	0	0	0	0	271	188	399	436	615	705	2,055	0	4,669	1,985	91	4.6%
PM	0.86	0	0	0	0	1,435	673	375	474	502	343	688	0	4,490	1,717	150	8.7%

Post-2030 Cumulative Fair-Share Analysis (Newport Beach)

62	NB	Campus Drive at Bristol Street NB															
EXISTING NO PROJECT															Difference	Difference	Fair
	ICU	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR	TOTAL	From Existing	From No Project	Share
AM	0.58	0	247	241	203	957	230	633	1,873	0	0	0	0	4,384			
PM	0.86	0	845	913	284	1,975	77	811	530	0	0	0	0	5,435			
POST-2030 Cumulative Baseline NO PROJECT																	
AM	0.72	0	240	345	210	1,453	426	603	2,174	0	0	0	0	5,451	1,067		
PM	0.92	0	985	1,168	315	2,408	131	734	669	0	0	0	0	6,410	975		
POST-2030 Cumulative Baseline WITH PROJECT																	
AM	0.76	0	293	457	207	1,555	461	618	2,259	0	0	0	0	5,850	1,466	399	27.2%
PM	0.95	0	1,044	1,196	346	2,550	154	765	776	0	0	0	0	6,831	1,396	421	30.2%
85	NB	MacArthur Boulevard at Birch Street															
EXISTING NO PROJECT															Difference	Difference	Fair
	ICU	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR	TOTAL	From Existing	From No Project	Share
AM	0.59	146	771	177	21	164	47	47	1,741	104	123	372	59	3,772			
PM	0.75	69	2,067	170	103	694	140	113	1,183	22	294	207		5,062			
POST-2030 Cumulative Baseline NO PROJECT																	
AM	0.73	178	823	197	58	472	140	45	1,736	110	168	538	74	4,539	767		
PM	0.92	179	2,221	212	124	967	179	125	1,200	51	288	463	22	6,031	969		
POST-2030 Cumulative Baseline WITH PROJECT																	
AM	0.73	163	848	223	56	502	124	55	1,750	108	176	549	86	4,640	868	101	11.6%
PM	0.97	180	2,260	213	136	1,046	188	132	1,230	53	302	497	24	6,261	1,199	230	19.2%

Post-2030 Cumulative Fair-Share Analysis (Santa Ana)

543	SA	Bristol Street at Segerstrom Avenue															
EXISTING NO PROJECT															Difference	Difference	Fair
	ICU	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR	TOTAL	From Existing	From No Project	Share
AM	0.62	202	1,101	76	148	421	71	55	668	162	174	700	63	3,841			

Post-2030 Cumulative With Project Fair Share Analysis

PM	0.74	152	909	91	190	728	102	154	1,239	262	207	593	201	4,828			
POST-2030 Cumulative Baseline NO PROJECT																	
AM	0.85	257	1,247	120	202	797	95	93	797	221	248	1,142	91	5,310	1,469		
PM	0.95	181	961	111	264	1,168	122	221	1,333	368	255	951	286	6,221	1,393		
POST-2030 Cumulative Baseline WITH PROJECT																	
AM	0.90	263	1,292	120	213	812	99	98	856	238	256	1,180	96	5,523	1,682	213	12.7%
PM	0.97	185	1,004	112	272	1,165	124	226	1,382	381	267	997	306	6,421	1,593	200	12.6%
723	**SA**	**Main Street at Dyer Road (Segerstrom Avenue)**															
EXISTING NO PROJECT															Difference	Difference	Fair
	ICU	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR	TOTAL	From Existing	From No Project	Share
AM	0.61	194	921	142	130	612	91	57	939	166	164	825	151	4,392			
PM	0.68	91	550	149	143	736	131	140	979	321	121	432	56	3,849			
POST-2030 Cumulative Baseline NO PROJECT																	
AM	0.81	199	1,098	184	178	909	106	87	471	201	244	1,240	264	5,181	789		
PM	0.89	86	616	180	202	1,123	158	217	1,202	388	190	666	103	5,131	1,282		
POST-2030 Cumulative Baseline WITH PROJECT																	
AM	0.86	209	1,153	192	184	934	107	94	498	219	245	1,283	273	5,391	999	210	21.0%
PM	0.91	90	648	183	210	1,125	158	222	1,224	412	199	728	112	5,311	1,462	180	12.3%
730	**SA**	**Grand Avenue at Warner Avenue**															
EXISTING NO PROJECT															Difference	Difference	Fair
	ICU	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR	TOTAL	From Existing	From No Project	Share
AM	0.46	157	527	209	75	243	76	178	556	191	329	668	218	3,427			
PM	0.69	125	555	279	151	717	247	269	669	92	365	349	159	3,977			
POST-2030 Cumulative Baseline NO PROJECT																	
AM	0.79	370	497	242	177	706	285	143	575	312	472	1,512	197	5,488	2,061		
PM	0.92	283	477	300	239	1,424	475	249	600	180	458	958	165	5,808	1,831		
POST-2030 Cumulative Baseline NO PROJECT																	
AM	0.83	373	539	278	195	820	294	172	617	331	488	1,546	217	5,870	2,443	382	15.6%
PM	0.96	308	522	311	261	1,470	497	262	640	198	477	1,027	178	6,151	2,174	343	15.8%

Post-2030 Cumulative Fair-Share Analysis (Tustin)

24	**Tus**	**Newport Avenue at Walnut Avenue**															
EXISTING NO PROJECT															Difference	Difference	Fair
	ICU	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR	TOTAL	From Existing	From No Project	Share
AM	0.68	568	288	19	76	260	322	24	438	96	34	197	27	2,349			
PM	0.70	468	400	43	112	429	500	57	377	68	19	242	36	2,751			
POST-2030 Cumuative Baseline NO PROJECT																	
AM	0.91	738	1,083	47	147	329	355	44	703	94	122	428	170	4,260	1,911		
PM	0.93	538	680	60	157	497	618	153	1,079	149	43	423	93	4,490	1,739		
POST-2030 Cumuative Baseline WITH PROJECT																	
AM	0.91	738	1,109	46	158	339	376	45	732	96	122	426	173	4,360	2,011	100	5.0%
PM	0.95	560	699	59	161	490	639	152	1,131	157	43	424	92	4,607	1,856	117	6.3%
93	**Tus**	**Tustin Ranch Road at El Camino Real**															
EXISTING NO PROJECT															Difference	Difference	Fair
	ICU	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR	TOTAL	From Existing	From No Project	Share
AM	0.90	61	2,141	72	230	101	58	100	433	122	100	118	475	4,011			
PM	0.69	112	630	45	223	388	282	471	1,919	278	54	205	132	4,739			
POST-2030 Cumuative Baseline NO PROJECT																	
AM	1.02	109	2,544	154	263	207	100	119	431	122	169	199	532	4,949	938		
PM	0.84	168	820	72	223	476	353	542	2,256	300	101	352	197	5,860	1,121		
POST-2030 Cumuative Baseline WITH PROJECT																	
AM	1.03	106	2,544	158	262	211	97	123	429	119	167	196	538	4,950	939	1	0.1%

Post-2030 Cumulative With Project Fair Share Analysis

PM	0.84	168	810	72	222	480	350	548	2,238	302	102	360	199	5,851	1,112	-9	-0.8%
134	**Tus**	**Loop Road/Park Avenue at Warner Avenue**															
EXISTING NO PROJECT															Difference	Difference	Fair
	ICU	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR	TOTAL	From Existing	From No Project	Share
AM	0.61	225	185	806	64	225	9	14	14	95	5	54	5	1,701			
PM	0.86	280	394	74	178	67	7	15	92	488	10	1,177	17	2,799			
POST-2030 Cumuative Baseline NO PROJECT																	
AM	0.43	155	137	1,034	144	872	11	24	7	87	42	788	79	3,380	1,679		
PM	1.05	191	275	296	332	716	29	80	192	442	41	2,087	31	4,712	1,913		
POST-2030 Cumuative Baseline WITH PROJECT																	
AM	0.48	161	128	1,042	140	919	12	29	9	110	49	919	82	3,600	1,899	220	11.6%
PM	1.07	196	263	302	346	797	36	76	201	425	46	2,132	29	4,849	2,050	137	6.7%
754	**Tus**	**Red Hill Avenue at Carnegie Avenue/A Street**															
EXISTING NO PROJECT															Difference	Difference	Fair
	ICU	SBL	SBT	SBR	WBL	WBT	WBR	NBL	NBT	NBR	EBL	EBT	EBR	TOTAL	From Existing	From No Project	Share
AM	0.38	0	1,285	117	0	0	0	106	542	0	7	0	8	2,065			
PM	0.53	0	742	10	0	0	0	23	2,098	0	121	0	58	3,052			
POST-2030 Cumuative Baseline NO PROJECT																	
AM	0.61	558	1,324	121	135	395	183	109	598	304	9	101	8	3,845	1,780		
PM	0.93	287	764	11	234	146	521	26	2,387	258	138	317	60	5,149	2,097		
POST-2030 Cumuative Baseline WITH PROJECT																	
AM	0.62	555	1,324	121	146	411	194	109	703	315	10	90	8	3,986	1,921	141	7.3%
PM	0.95	273	721	11	252	162	502	26	2,465	285	142	325	61	5,225	2,173	76	3.5%

Post-2030 Cumulative With Project Arterial Fair Share Analysis

Fair-share analysis for #1884: MacArthur from SR-55 to Main Street (Santa Ana)	Existing ADT	Future No Project ADT	Future With Project ADT	No Project Different From Existing	With Project Different From Existing	Different from No Project	Fair Share
Post-2030 Cumulative With Project	47,010	51,000	52,800	3,990	5,790	1,800	31.1%
FAIR SHARE							**31.1%**

Appendix I HCS Intersection Analysis

Appendix I-1	**Existing Conditions Intersection HCS Reports**
Appendix I-2	**Existing With Project Conditions Intersection HCS Reports**
Appendix I-3	**2015 Cumulative Baseline No Project Intersection HCS Reports**
Appendix I-4	**2015 Cumulative Baseline With Project Intersection HCS Reports**
Appendix I-5	**Post-2030 Cumulative Baseline No Project Intersection HCS Reports**
Appendix I-6	**Post-2030 Cumulative Baseline With Project Intersection HCS Reports**
Appendix I-7	**Existing General Plan Build-out Intersection HCS Reports**
Appendix I-8	**Post-2030 Cumulative Baseline With Project (MPAH Network) Intersection HCS Reports**

Caltrans Jurisdiction Intersection Analysis
HCS Peak Hour Intersection LOS

ID	Intersection	Existing				Existing With Project				2015 Cumulative Baseline No Project				2015 Cumulative With Project			
		Control Delay	LOS	Control Delay	LOS	Control Delay	LOS	Control Delay	LOS	Control Delay	LOS	Control Delay	LOS	Control Delay	LOS	Control Delay	LOS
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
223	Culver at the I-5 SB Ramps	17.3	B	44.6	D	15.9	B	47.1	D	11.4	B	16.9	B	11.3	B	16.6	B
128	Jamboree Road at I-5 NB Ramps	29.4	C	69.1	**E**	29.2	C	68.6	**E**	28.0	C	47.7	D	26.1	C	48.4	D
129	Jamboree Road at I-5 SB Ramps	59.0	**E**	43.4	D	66.2	**E**	50.5	D	14.0	B	11.9	B	14.7	B	12.1	B
94	Tustin Ranch Road at I-5 NB Ramps	14.0	B	13.8	B	14.0	B	13.8	B	34.5	C	16.8	B	34.6	C	16.9	B
95	Tustin Ranch Road at I-5 SB Ramps	50.5	D	22.2	C	51.3	D	22.8	C	99.1	**F**	25.4	C	96.5	**F**	24.5	C
478	Redhill Avenue at I-5 NB Ramps	32.8	C	24.8	C	34.1	C	24.9	C	36.8	D	26.9	C	36.7	D	26.1	C
479	Redhill Avenue at I-5 SB Ramps	44.9	D	24.0	C	46.1	D	24.5	C	60.5	**E**	30.6	C	59.6	**E**	31.1	C
22	Newport Avenue at I-5 SB Ramps	33.5	C	88.1	**F**	35.2	D	86.4	**F**	30.2	C	82.8	**F**	30.0	C	82.4	**F**
232	Culver Drive at I-405 NB Ramps	10.2	B	34.0	C	10.4	B	35.9	D	10.9	B	35.4	D	10.8	B	36.4	D
233	Culver Drive at I-405 SB Ramps	15.9	B	25.4	C	17.6	B	31.3	C	16.5	B	25.6	C	16.8	B	26.6	C
143	Jamboree Road at I-405 NB Ramps	20.5	C	12.4	B	34.7	C	23.1	C	20.2	C	13.5	B	28.0	C	17.8	B
144	Jamboree Road at I-405 SB Ramps	59.5	**E**	94.7	**F**	113.7	**F**	112.4	**F**	61.3	**E**	96.4	**F**	75.1	**E**	103.8	**F**
79	Macarthur Boulevard at I-405 NB Ramps	22.1	C	25.5	C	26.8	C	30.5	C	24.6	C	25.6	C	27.8	C	26.4	C
80	Macarthur Boulevard at I-405 SB Ramps	15.7	B	44.8	D	17.7	B	33.9	C	17.0	B	48.1	D	16.0	B	53.3	D
13	Baker Street at SR-55 NB Ramps	30.2	C	33.6	C	30.7	C	35.1	D	32.6	C	41.4	D	32.6	C	32.7	C
12	Baker Street at SR-55 SB Ramps	20.5	C	23.5	C	20.8	C	24.2	C	24.7	C	28.1	C	24.8	C	29.3	C
11	Paularino Avenue at SR-55 NB Ramps	21.3	C	31.9	C	21.9	C	36.4	D	18.5	B	37.8	D	18.8	B	38.2	D
10	Paularino Avenue at SR-55 SB Ramps	28.8	C	19.8	B	29.4	C	20.9	C	39.3	D	21.3	C	40.5	D	21.8	C
9	Macarthur Boulevard at SR-55 NB Ramps	12.0	B	7.4	A	14.2	B	7.6	A	26.1	C	7.9	A	24.6	C	7.9	A
8	Macarthur Boulevard at SR-55 SB Ramps	14.7	B	10.7	B	16.5	B	11.3	B	16.1	B	11.4	B	16.6	B	11.6	B
7	Dyer Road at SR-55 NB Ramps	32.1	C	8.7	A	36.1	D	9.7	A	34.6	C	10.0	B	34.8	C	10.4	B
731	Grand Avenue at SR-55 SB Ramps	13.7	B	11.7	B	13.5	B	11.7	B	13.5	B	11.7	B	13.5	B	11.7	B

Note: Timing plans provided by Caltrans

Caltrans Jurisdiction Intersection Analysis
HCS Peak Hour Intersection LOS

ID	Intersection	Post-2030 Cumulative Baseline No Project				Post-2030 Cumulative With Project				Post-2030 Existing General Plan				Post-2030 Cumulative Baseline+MPAH Buildout			
		Control Delay	LOS	Control Delay	LOS	Control Delay	LOS	Control Delay	LOS	Control Delay	LOS	Control Delay	LOS	Control Delay	LOS	Control Delay	LOS
		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
223	Culver at the I-5 SB Ramps	10.2	B	19.8	B	10.3	B	20.7	C	10.5	B	21.8	C	10.2	B	20.3	C
128	Jamboree Road at I-5 NB Ramps	42.8	D	27.7	C	37.1	D	50.6	D	40.1	D	52.3	D	39.4	D	50.3	D
129	Jamboree Road at I-5 SB Ramps	14.5	B	11.9	B	14.1	B	12.6	B	14.6	B	12.3	B	13.8	B	11.7	B
94	Tustin Ranch Road at I-5 NB Ramps	47.5	D	17.3	B	45.9	D	17.1	B	50.3	D	17.1	B	46.1	D	17.8	B
95	Tustin Ranch Road at I-5 SB Ramps	88.2	**F**	21.5	C	88.8	**F**	21.2	C	91.8	**F**	21.7	C	87.5	**F**	21.6	C
478	Redhill Avenue at I-5 NB Ramps	65.8	**E**	34.0	C	64.3	**E**	33.1	C	61.8	**E**	34.5	C	61.3	**E**	34.0	C
479	Redhill Avenue at I-5 SB Ramps	48.6	D	32.1	C	52.9	D	34.6	C	52.9	D	34.6	C	49.6	D	32.1	C
22	Newport Avenue at I-5 SB Ramps	22.7	C	50.2	D	23.3	C	53.2	D	23.6	C	52.0	D	22.8	C	49.3	D
232	Culver Drive at I-405 NB Ramps	13.3	B	44.1	D	13.2	B	47.0	D	13.0	B	45.4	D	12.7	B	43.3	D
233	Culver Drive at I-405 SB Ramps	20.5	C	34.1	C	20.5	C	43.3	D	20.8	C	38.2	D	21.2	C	28.6	C
143	Jamboree Road at I-405 NB Ramps	20.5	C	14.6	B	31.0	C	27.9	C	25.7	C	35.6	D	24.9	C	11.2	B
144	Jamboree Road at I-405 SB Ramps	62.6	**E**	92.8	**F**	112.1	**F**	114.3	**F**	125.3	**F**	104.0	**F**	85.0	**F**	86.1	**F**
79	Macarthur Boulevard at I-405 NB Ramps	25.3	C	26.8	C	33.3	C	28.5	C	32.7	C	29.9	C	28.4	C	27.7	C
80	Macarthur Boulevard at I-405 SB Ramps	16.7	B	32.5	C	18.4	B	39.9	D	18.1	B	44.4	D	18.2	B	39.4	D
13	Baker Street at SR-55 NB Ramps	49.5	D	41.6	D	53.3	D	48.3	D	55.1	**E**	50.1	D	47.9	D	44.1	D
12	Baker Street at SR-55 SB Ramps	57.3	**E**	43.5	D	61.5	**E**	46.6	D	66.9	**E**	46.0	D	56.7	**E**	43.2	D
11	Paularino Avenue at SR-55 NB Ramps	22.3	C	40.6	D	23.1	C	42.2	D	23.2	C	40.8	D	21.7	C	36.3	D
10	Paularino Avenue at SR-55 SB Ramps	88.4	**F**	21.7	C	90.2	**F**	22.5	C	90.4	**F**	25.7	C	84.5	**F**	21.6	C
9	Macarthur Boulevard at SR-55 NB Ramps	41.7	D	8.4	A	48.9	D	9.1	A	35.9	D	9.1	A	24.9	C	8.1	A
8	Macarthur Boulevard at SR-55 SB Ramps	18.6	B	10.8	B	19.5	B	11.0	B	22.6	C	10.8	B	15.8	B	10.1	B
7	Dyer Road at SR-55 NB Ramps	68.9	**E**	15.9	B	74.0	**E**	18.3	B	87.4	**F**	21.2	C	40.4	D	23.2	C
731	Grand Avenue at SR-55 SB Ramps	14.2	B	11.9	B	14.5	B	11.9	B	14.6	B	12.1	B	13.9	B	12.1	B

Note: Timing plans provided by Caltrans

Appendix I-1 **Existing Conditions HCS Intersection Worksheets**

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/2009
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-5 SB Ramps

Inter.: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	418	0	501					1006	238		1732	312
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	29.8	0.0				23.0	11.2	0.0	
Yellow	3.6					3.6	4.3		
All Red	1.5					1.5	1.5		

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	659	1770	0.67	0.37	23.6	C		
LTR	694	1863	0.00	0.37	15.8	B	32.3	C
R	590	1583	0.89	0.37	39.6	D		
Westbound								
Northbound								
T	2493	5074	0.42	0.49	13.2	B	10.7	B
R	1583	1583	0.16	1.00	0.0+	A		
Southbound								
T	2493	5074	0.73	0.49	17.3	B	14.7	B
R	1583	1583	0.21	1.00	0.1	A		

Intersection Delay = 17.3 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/2009
Analysis Time Period:	AM Peak Hour
Intersection:	Culver at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-5 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	418	0	501					1006	238		1732	312
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	110	0	132					265	63		456	82
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	440	0	527					1059	251		1823	328
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	29.8	0.0			23.0	11.2	0.0	
Yellow	3.6				3.6	4.3		
All Red	1.5				1.5	1.5		

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	418	0	501					1006	238		1732	312
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	440	0	527					1059	251		1823	328
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR R					T	R		T	R
Adj flow	440	0	527					1059	251		1823	328
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound				Northbound			Southbound	
LG	L	LTR	R					T	R		T	R
So	1900	1900	1900					1900	1900		1900	1900
Lanes	1	1	1	0	0	0	0	3	1	0	3	1
fW	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980					0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fLU	1.000	1.000	1.000					0.908	1.000		0.908	1.000
fRT		1.000	0.850					1.000	0.850		1.000	0.850
fLT	0.950	1.000						1.000			1.000	
Sec.												
fLpb	1.000	1.000						1.000			1.000	
fRpb		1.000	1.000					1.000	1.000		1.000	1.000
S	1770	1863	1583					5074	1583		5074	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	440	1770		0.25	0.37	659	0.67
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.37	694	0.00
Right	R	527	1583	#	0.33	0.37	590	0.89
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1059	5074		0.21	0.49	2493	0.42
Right	R	251	1583		0.16	1.00	1583	0.16
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1823	5074	#	0.36	0.49	2493	0.73
Right	R	328	1583		0.21	1.00	1583	0.21

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.69
Total lost time per cycle, L = 10.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.80

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.67	0.37	21.0	1.000	659	0.24	2.6	0.0	23.6	C		
LTR	0.00	0.37	15.8	1.000	694	0.11	0.0	0.0	15.8	B	32.3	C
R	0.89	0.37	23.6	1.000	590	0.42	16.0	0.0	39.6	D		
Westbound												
Northbound												
T	0.42	0.49	13.1	1.000	2493	0.11	0.1	0.0	13.2	B	10.7	B
R	0.16	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Southbound												

T	0.73	0.49	16.2	1.000	2493	0.29	1.1	0.0	17.3	B	14.7	B
R	0.21	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 17.3 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	80.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	80.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	25.1	21.0	0.00	0.0	0.0	23.6

LTR	0.0	0.00	25.1	15.8	0.00	0.0	0.0	15.8
R	0.0	0.00	25.1	23.6	0.00	0.0	0.0	39.6
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	20.4	13.1	0.00	0.0	0.0	13.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Southbound								
	0.0						0.0	
T	0.0	0.00	20.4	16.2	0.00	0.0	0.0	17.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 17.3 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup	L	LTR	R				T	R	T	R
Init Queue	0.0	0.0	0.0				0.0	0.0	0.0	0.0
Flow Rate	440	0	527				388	251	669	328
So	1900	1900	1900				1900	1900	1900	1900
No.Lanes	1	1	1	0	0	0	3	1	3	1
SL	1770	1863	1583				1862	1583	1862	1583
LnCapacity	659	694	590				915	1583	915	1583
Flow Ratio	0.2	0.0	0.3				0.2	0.2	0.4	0.2
v/c Ratio	0.67	0.00	0.89				0.42	0.16	0.73	0.21
Grn Ratio	0.37	0.37	0.37				0.49	1.00	0.49	1.00
I Factor		1.000					1.000		1.000	
AT or PVG	3	3	3				3	3	3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00				1.00		1.00	
Q1	8.2	0.0	11.0				5.5		11.8	
kB	0.5	0.5	0.5				0.6	0.8	0.6	0.8
Q2	1.0	0.0	2.9				0.4	0.2	1.6	0.2
Q Average	9.1	0.0	13.9				6.0		13.4	
Q Spacing	25.0	25.0	25.0				25.0	25.0	25.0	25.0
Q Storage	0	0	0				0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2	1.2				1.2		1.2	
BOQ	10.8	0.0	16.3				7.1		15.7	
QSRatio										
85th Percentile Output:										
fB%	1.5	1.6	1.5				1.5		1.5	
BOQ	13.9	0.0	20.7				9.3		20.0	
QSRatio										
90th Percentile Output:										
fB%	1.7	1.8	1.6				1.7		1.6	
BOQ	15.1	0.0	22.2				10.2		21.5	
QSRatio										
95th Percentile Output:										
fB%	1.9	2.1	1.8				1.9		1.8	
BOQ	17.0	0.0	24.7				11.6		23.9	
QSRatio										
98th Percentile Output:										
fB%	2.2	2.7	2.0				2.3		2.1	
BOQ	20.1	0.0	28.4				14.0		27.5	
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-5 SB Ramps

Inter.: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	700	0	903					1731	296		1214	224
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	46.2	0.0				9.3	18.4	0.0	
Yellow	3.6					3.6	4.3		
All Red	1.5					1.5	1.5		

Cycle Length: 89.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	910	1770	0.81	0.51	23.8	C		
LTR	957	1863	0.00	0.51	10.6	B	72.7	E
R	814	1583	1.17	0.51	110.7	F		
Westbound								
Northbound								
T	1851	5074	0.98	0.36	45.6	D	38.9	D
R	1583	1583	0.20	1.00	0.1	A		
Southbound								
T	1851	5074	0.69	0.36	25.4	C	21.4	C
R	1583	1583	0.15	1.00	0.0+	A		

Intersection Delay = 44.6 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/30/09
Analysis Time Period: PM Peak Hour
Intersection: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2008
Project ID: IBC Vision Traffic Study - Existing

E/W St: I-5 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	700	0	903					1731	296		1214	224
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	184	0	238					456	78		319	59
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	737	0	951					1822	312		1278	236
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	46.2	0.0			9.3	18.4	0.0	
Yellow	3.6				3.6	4.3		
All Red	1.5				1.5	1.5		

Cycle Length: 89.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	700	0	903					1731	296		1214	224
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	737	0	951					1822	312		1278	236
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	737	0	951					1822	312		1278	236
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound				Northbound			Southbound	
LG	L	LTR	R					T	R		T	R
So	1900	1900	1900					1900	1900		1900	1900
Lanes	1	1	1	0	0	0	0	3	1	0	3	1
fW	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980					0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fLU	1.000	1.000	1.000					0.908	1.000		0.908	1.000
fRT		1.000	0.850					1.000	0.850		1.000	0.850
fLT	0.950	1.000						1.000			1.000	
Sec.												
fLpb	1.000	1.000						1.000			1.000	
fRpb		1.000	1.000					1.000	1.000		1.000	1.000
S	1770	1863	1583					5074	1583		5074	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	737	1770		0.42	0.51	910	0.81
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.51	957	0.00
Right	R	951	1583	#	0.60	0.51	814	1.17
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1822	5074	#	0.36	0.36	1851	0.98
Right	R	312	1583		0.20	1.00	1583	0.20
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1278	5074		0.25	0.36	1851	0.69
Right	R	236	1583		0.15	1.00	1583	0.15

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.96
Total lost time per cycle, L = 10.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.09

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.81	0.51	18.2	1.000	910	0.35	5.6	0.0	23.8	C		
LTR	0.00	0.51	10.6	1.000	957	0.11	0.0	0.0	10.6	B	72.7	E
R	1.17	0.51	21.9	1.000	814	0.50	88.8	0.0	110.7	F		
Westbound												
Northbound												
T	0.98	0.36	28.3	1.000	1851	0.49	17.3	0.0	45.6	D	38.9	D
R	0.20	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.69	0.36	24.2	1.000	1851	0.26	1.1	0.0	25.4	C	21.4	C
R	0.15	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		

Intersection delay = 44.6 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 89.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 89.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	89.9 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	21.9	18.2	0.00	0.0	0.0	23.8

LTR	0.0	0.00	21.9	10.6	0.00	0.0	0.0	10.6
R	0.0	0.00	21.9	21.9	0.00	34.3	0.0	110.7
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	28.6	28.3	0.00	0.0	0.0	45.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	28.6	24.2	0.00	0.0	0.0	25.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+

Intersection Delay 44.6 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup	L	LTR	R				T	R	T	R
Init Queue	0.0	0.0	0.0				0.0	0.0	0.0	0.0
Flow Rate	737	0	951				668	312	469	236
So	1900	1900	1900				1900	1900	1900	1900
No.Lanes	1	1	1	0	0	0	3	1	3	1
SL	1770	1863	1583				1862	1583	1862	1583
LnCapacity	910	957	814				679	1583	679	1583
Flow Ratio	0.4	0.0	0.6				0.4	0.2	0.3	0.1
v/c Ratio	0.81	0.00	1.17				0.98	0.20	0.69	0.15
Grn Ratio	0.51	0.51	0.51				0.36	1.00	0.36	1.00
I Factor		1.000					1.000		1.000	
AT or PVG	3	3	3				3	3	3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00				1.00		1.00	
Q1	15.3	0.0	23.7				16.5		9.9	
kB	0.7	0.7	0.6				0.5	0.9	0.5	0.9
Q2	2.5	0.0	20.6				6.1	0.2	1.2	0.2
Q Average	17.8	0.0	44.4				22.6		11.1	
Q Spacing	25.0	25.0	25.0				25.0	25.0	25.0	25.0
Q Storage	0	0	0				0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2	1.1				1.2		1.2	
BOQ	20.7	0.0	50.3				26.2		13.1	
QSRatio										
85th Percentile Output:										
fB%	1.5	1.6	1.4				1.4		1.5	
BOQ	26.1	0.0	60.7				32.6		16.8	
QSRatio										
90th Percentile Output:										
fB%	1.6	1.8	1.4				1.5		1.6	
BOQ	27.9	0.0	64.1				34.6		18.1	
QSRatio										
95th Percentile Output:										
fB%	1.7	2.1	1.6				1.7		1.8	
BOQ	30.7	0.0	68.8				37.8		20.3	
QSRatio										
98th Percentile Output:										
fB%	2.0	2.7	1.7				1.9		2.1	
BOQ	34.8	0.0	76.9				42.4		23.6	
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-5 NB Ramps

Inter.: Jamboree at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	0	3	1	0	3	1
LGConfig				L		LTR	R		T	R		T	R
Volume				879	0	452		1209	671		1806	474
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	41.3	0.0			9.5	19.0	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 85.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	860	1770	1.08	0.49	74.9	E		
LTR	905	1863	0.00	0.49	11.2	B	55.5	E
R	769	1583	0.62	0.49	17.6	B		
Northbound								
T	2018	5074	0.63	0.40	21.2	C	13.7	B
R	1583	1583	0.45	1.00	0.2	A		
Southbound								
T	2018	5074	0.94	0.40	34.3	C	27.2	C
R	1583	1583	0.32	1.00	0.1	A		

Intersection Delay = 29.4 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-5 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				879	0	452		1209	671		1806	474
% Heavy Veh				2	2	2		2	2		2	2
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
PK 15 Vol				231	0	119		318	177		475	125
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1	0	3	1	0	3	1
LGConfig				L		LTR	R		T	R		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0		12.0	12.0
RTOR Vol						0				0			0
Adj Flow				925	0	476		1273	706		1901	499
%InSharedLn				0		0							
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0		0.0	0.0
Arriv. Type				3	3	3		3	3		3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		41.3	0.0			9.5	19.0	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 85.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				879	0	452		1209	671		1806	474
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
Adj flow				925	0	476		1273	706		1901	499
No. Lanes	0	0	0		1	1	1	0	3	1	0	3	1
Lane group				L		LTR	R		T	R		T	R
Adj flow				925	0	476		1273	706		1901	499
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG			L	LTR	R		T	R		T	R	
So			1900	1900	1900		1900	1900		1900	1900	
Lanes	0	0	1	1	1	0	3	1	0	3	1	
fW			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fHV			0.980	0.980	0.980		0.980	0.980		0.980	0.980	
fG			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fP			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fBB			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fA			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fLU			1.000	1.000	1.000		0.908	1.000		0.908	1.000	
fRT				1.000	0.850		1.000	0.850		1.000	0.850	
fLT			0.950	1.000			1.000			1.000		
Sec.												
fLpb			1.000	1.000			1.000			1.000		
fRpb				1.000	1.000		1.000	1.000		1.000	1.000	
S			1770	1863	1583		5074	1583		5074	1583	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	925	1770	#	0.52	0.49	860	1.08
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.49	905	0.00
Right	R	476	1583		0.30	0.49	769	0.62
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1273	5074		0.25	0.40	2018	0.63
Right	R	706	1583		0.45	1.00	1583	0.45
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1901	5074	#	0.37	0.40	2018	0.94
Right	R	499	1583		0.32	1.00	1583	0.32

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.90
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.02

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.08	0.49	21.9	1.000	860	0.50	53.1	0.0	74.9	E		
LTR	0.00	0.49	11.2	1.000	905	0.11	0.0	0.0	11.2	B	55.5	E
R	0.62	0.49	16.1	1.000	769	0.20	1.5	0.0	17.6	B		
Northbound												
T	0.63	0.40	20.6	1.000	2018	0.21	0.6	0.0	21.2	C	13.7	B
R	0.45	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.94	0.40	24.7	1.000	2018	0.45	9.6	0.0	34.3	C	27.2	C
R	0.32	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 29.4 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	85.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	85.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

			EBLT	WBLT	NBLT	SBLT
Cycle length, C	85.0	sec				
Adj. LT vol from Vol Adjustment Worksheet, v						
v/c ratio from Capacity Worksheet, X						
Protected phase effective green interval, g (s)						
Opposing queue effective green interval, gq						
Unopposed green interval, gu						
Red time r=(C-g-gq-gu)						
Arrival rate, qa=v/(3600(max[X,1.0]))						
Protected ph. departure rate, Sp=s/3600						
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)						
XPerm						
XProt						
Case						
Queue at beginning of green arrow, Qa						
Queue at beginning of unsaturated green, Qu						
Residual queue, Qr						
Uniform Delay, d1						

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	21.9	21.9	0.00	16.3	0.0	74.9
LTR	0.0	0.00	21.9	11.2	0.00	0.0	0.0	11.2
R	0.0	0.00	21.9	16.1	0.00	0.0	0.0	17.6
Northbound								
	0.0						0.0	
T	0.0	0.00	25.6	20.6	0.00	0.0	0.0	21.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	25.6	24.7	0.00	0.0	0.0	34.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 29.4 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	LTR	R	T	R		T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate				925	0	476	467	706		697	499	
So				1900	1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0	1	1	1	0 3	1	0	3	1	
SL				1770	1863	1583	1862	1583		1862	1583	
LnCapacity				860	905	769	740	1583		740	1583	
Flow Ratio				0.5	0.0	0.3	0.3	0.4		0.4	0.3	
v/c Ratio				1.08	0.00	0.62	0.63	0.45		0.94	0.32	
Grn Ratio				0.49	0.49	0.49	0.40	1.00		0.40	1.00	
I Factor					1.000		1.000			1.000		
AT or PVG				3	3	3	3	3		3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
PF2				1.00	1.00	1.00	1.00			1.00		
Q1				21.8	0.0	8.3	8.9			15.8		
kB				0.6	0.6	0.6	0.6	0.9		0.6	0.9	
Q2				13.4	0.0	0.9	0.9	0.7		4.8	0.4	
Q Average				35.2	0.0	9.2	9.8			20.6		
Q Spacing				25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage				0	0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.1	1.2	1.2	1.2			1.2		
BOQ				40.2	0.0	10.8	11.5			23.9		
QSRatio												
85th Percentile Output:												
fB%				1.4	1.6	1.5	1.5			1.5		
BOQ				49.1	0.0	13.9	14.9			29.9		
QSRatio												
90th Percentile Output:												
fB%				1.5	1.8	1.7	1.6			1.5		
BOQ				51.7	0.0	15.2	16.1			31.8		
QSRatio												
95th Percentile Output:												
fB%				1.6	2.1	1.9	1.8			1.7		
BOQ				55.8	0.0	17.1	18.1			34.9		
QSRatio												
98th Percentile Output:												
fB%				1.8	2.7	2.2	2.2			1.9		
BOQ				62.2	0.0	20.1	21.3			39.3		
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-5 NB Ramps

Inter.: Jamboree at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	0	3	1	0	3	1
LGConfig				L		LTR	R		T	R		T	R
Volume				302	0	897		2654	600		1476	480
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	45.0	0.0				25.5	34.3	0.0
Yellow	3.6					4.3	4.3	
All Red	1.0					1.0	1.0	

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	664	1770	0.48	0.38	29.1	C		
LTR	699	1863	0.00	0.38	23.4	C	239.7	F
R	594	1583	1.59	0.38	310.6	F		
Northbound								
T	2753	5074	1.01	0.54	48.4	D	39.5	D
R	1583	1583	0.40	1.00	0.2	A		
Southbound								
T	2753	5074	0.56	0.54	18.4	B	13.9	B
R	1583	1583	0.32	1.00	0.1	A		

Intersection Delay = 69.1 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	PM Peak Hour
Intersection:	Jamboree at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-5 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				302	0	897		2654	600		1476	480
% Heavy Veh				2	2	2		2	2		2	2
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
PK 15 Vol				79	0	236		698	158		388	126
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1	0	3	1	0	3	1
LGConfig				L		LTR	R		T	R		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0		12.0	12.0
RTOR Vol						0				0			0
Adj Flow				318	0	944		2794	632		1554	505
%InSharedLn				0		0						
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0		0.0	0.0
Arriv. Type				3	3	3		3	3		3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		45.0	0.0			25.5	34.3	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				302	0	897		2654	600		1476	480
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
Adj flow				318	0	944		2794	632		1554	505
No. Lanes	0	0	0		1	1	1	0	3	1	0	3	1
Lane group				L		LTR	R		T	R		T	R
Adj flow				318	0	944		2794	632		1554	505
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L	LTR	R		T	R		T	R	
So			1900	1900	1900		1900	1900		1900	1900	
Lanes	0	0	1	1	1	0	3	1	0	3	1	
fW			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fHV			0.980	0.980	0.980		0.980	0.980		0.980	0.980	
fG			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fP			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fBB			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fA			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fLU			1.000	1.000	1.000		0.908	1.000		0.908	1.000	
fRT				1.000	0.850		1.000	0.850		1.000	0.850	
fLT			0.950	1.000			1.000			1.000		
Sec.												
fLpb			1.000	1.000			1.000			1.000		
fRpb				1.000	1.000		1.000	1.000		1.000	1.000	
S			1770	1863	1583		5074	1583		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	318	1770		0.18	0.38	664	0.48
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.38	699	0.00
Right	R	944	1583	#	0.60	0.38	594	1.59
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2794	5074	#	0.55	0.54	2753	1.01
Right	R	632	1583		0.40	1.00	1583	0.40
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1554	5074		0.31	0.54	2753	0.56
Right	R	505	1583		0.32	1.00	1583	0.32

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.15
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.25

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.48	0.38	28.6	1.000	664	0.11	0.5	0.0	29.1	C		
LTR	0.00	0.38	23.4	1.000	699	0.11	0.0	0.0	23.4	C	239.7	F
R	1.59	0.38	37.5	1.000	594	0.50	273.1	0.0	310.6	F		
Northbound												
T	1.01	0.54	27.5	1.000	2753	0.50	21.0	0.0	48.4	D	39.5	D
R	0.40	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.56	0.54	18.1	1.000	2753	0.16	0.3	0.0	18.4	B	13.9	B
R	0.32	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 69.1 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	120.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	120.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	120.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	37.5	28.6	0.00	0.0	0.0	29.1
LTR	0.0	0.00	37.5	23.4	0.00	0.0	0.0	23.4
R	0.0	0.00	37.5	37.5	0.00	87.5	0.0	310.6
Northbound								
	0.0						0.0	
T	0.0	0.00	27.5	27.5	0.00	10.2	0.0	48.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	27.5	18.1	0.00	0.0	0.0	18.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 69.1 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup				L	LTR	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				318	0	944	1025	632	570	505
So				1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	1	1	1	3	1	3	1
SL				1770	1863	1583	1862	1583	1862	1583
LnCapacity				664	699	594	1010	1583	1010	1583
Flow Ratio				0.2	0.0	0.6	0.6	0.4	0.3	0.3
v/c Ratio				0.48	0.00	1.59	1.01	0.40	0.56	0.32
Grn Ratio				0.38	0.38	0.38	0.54	1.00	0.54	1.00
I Factor					1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00	1.00		1.00	
Q1				8.1	0.0	31.5	34.2		12.5	
kB				0.6	0.7	0.6	0.8	1.1	0.8	1.1
Q2				0.6	0.0	45.3	11.3	0.7	1.0	0.5
Q Average				8.7	0.0	76.8	45.4		13.6	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%				1.2	1.2	1.1	1.1		1.2	
BOQ				10.2	0.0	85.6	51.4		15.9	
QSRatio										
85th Percentile Output:										
fB%				1.5	1.6	1.3	1.4		1.5	
BOQ				13.2	0.0	102	62.1		20.2	
QSRatio										
90th Percentile Output:										
fB%				1.7	1.8	1.4	1.4		1.6	
BOQ				14.4	0.0	108	65.5		21.8	
QSRatio										
95th Percentile Output:										
fB%				1.9	2.1	1.5	1.5		1.8	
BOQ				16.2	0.0	116	70.3		24.2	
QSRatio										
98th Percentile Output:										
fB%				2.2	2.7	1.7	1.7		2.1	
BOQ				19.2	0.0	131	78.6		27.9	
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-5 SB Ramps

Inter.: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	441	0	988					1435	367		2027	506
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	44.2	0.0				14.1	21.5	0.0	
Yellow	3.6					4.3	4.3		
All Red	1.0					1.0	1.0		

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	824	1770	0.56	0.47	19.3	B		
LTR	867	1863	0.00	0.47	13.6	B	157.0	F
R	737	1583	1.41	0.47	218.4	F		
Westbound								
Northbound								
T	2184	5074	0.69	0.43	22.9	C	18.3	B
R	1583	1583	0.24	1.00	0.1	A		
Southbound								
T	2184	5074	0.98	0.43	40.8	D	32.7	C
R	1583	1583	0.34	1.00	0.1	A		

Intersection Delay = 59.0 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-5 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	441	0	988					1435	367		2027	506
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	116	0	260					378	97		533	133
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	464	0	1040					1511	386		2134	533
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		44.2	0.0			14.1	21.5	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	441	0	988					1435	367		2027	506
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	464	0	1040					1511	386		2134	533
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR R					T	R		T	R
Adj flow	464	0	1040					1511	386		2134	533
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound							Northbound							Southbound						
LG	L		LTR	R											T	R						T	R				
So	1900		1900	1900											1900	1900						1900	1900				
Lanes	1		1		0		0		0						3	1		0				3	1				
fW	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fHV	0.980		0.980	0.980											0.980	0.980						0.980	0.980				
fG	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fP	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fBB	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fA	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fLU	1.000		1.000	1.000											0.908	1.000						0.908	1.000				
fRT			1.000	0.850											1.000	0.850						1.000	0.850				
fLT	0.950		1.000												1.000							1.000					
Sec.																											
fLpb	1.000		1.000												1.000							1.000					
fRpb			1.000	1.000											1.000	1.000						1.000	1.000				
S	1770		1863	1583											5074	1583						5074	1583				
Sec.																											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	464	1770		0.26	0.47	824	0.56
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.47	867	0.00
Right	R	1040	1583	#	0.66	0.47	737	1.41
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1511	5074		0.30	0.43	2184	0.69
Right	R	386	1583		0.24	1.00	1583	0.24
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2134	5074	#	0.42	0.43	2184	0.98
Right	R	533	1583		0.34	1.00	1583	0.34

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.08
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.20

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.56	0.47	18.4	1.000	824	0.16	0.9	0.0	19.3	B		
LTR	0.00	0.47	13.6	1.000	867	0.11	0.0	0.0	13.6	B	157.0	F
R	1.41	0.47	25.4	1.000	737	0.50	193.0	0.0	218.4	F		
Westbound												
Northbound												
T	0.69	0.43	21.9	1.000	2184	0.26	1.0	0.0	22.9	C	18.3	B
R	0.24	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.98	0.43	26.6	1.000	2184	0.48	14.2	0.0	40.8	D	32.7	C
R	0.34	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 59.0 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	25.4	18.4	0.00	0.0	0.0	19.3

LTR	0.0	0.00	25.4	13.6	0.00	0.0	0.0	13.6
R	0.0	0.00	25.4	25.4	0.00	75.7	0.0	218.4
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	27.1	21.9	0.00	0.0	0.0	22.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	27.1	26.6	0.00	0.0	0.0	40.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 59.0 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup	L	LTR	R				T	R	T	R
Init Queue	0.0	0.0	0.0				0.0	0.0	0.0	0.0
Flow Rate	464	0	1040				554	386	783	533
So	1900	1900	1900				1900	1900	1900	1900
No.Lanes	1	1	1	0	0	0	3	1	3	1
SL	1770	1863	1583				1862	1583	1862	1583
LnCapacity	824	867	737				801	1583	801	1583
Flow Ratio	0.3	0.0	0.7				0.3	0.2	0.4	0.3
v/c Ratio	0.56	0.00	1.41				0.69	0.24	0.98	0.34
Grn Ratio	0.47	0.47	0.47				0.43	1.00	0.43	1.00
I Factor		1.000					1.000		1.000	
AT or PVG	3	3	3				3	3	3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00				1.00		1.00	
Q1	8.9	0.0	27.4				11.9		20.3	
kB	0.6	0.7	0.6				0.6	0.9	0.6	0.9
Q2	0.8	0.0	39.8				1.3	0.3	6.8	0.5
Q Average	9.7	0.0	67.3				13.2		27.1	
Q Spacing	25.0	25.0	25.0				25.0	25.0	25.0	25.0
Q Storage	0	0	0				0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2	1.1				1.2		1.2	
BOQ	11.4	0.0	75.2				15.5		31.2	
QSRatio										
85th Percentile Output:										
fB%	1.5	1.6	1.3				1.5		1.4	
BOQ	14.7	0.0	89.6				19.7		38.5	
QSRatio										
90th Percentile Output:										
fB%	1.6	1.8	1.4				1.6		1.5	
BOQ	15.9	0.0	95.1				21.2		40.7	
QSRatio										
95th Percentile Output:										
fB%	1.9	2.1	1.5				1.8		1.6	
BOQ	17.9	0.0	102				23.6		44.2	
QSRatio										
98th Percentile Output:										
fB%	2.2	2.7	1.7				2.1		1.8	
BOQ	21.0	0.0	115				27.2		49.4	
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-5 SB Ramps

Inter.: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L	LTR	R					T	R		T	R
Volume	684	0	691					2536	915		1344	434
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	44.8	0.0				34.7	20.3	0.0	
Yellow	3.6					4.3	4.3		
All Red	1.0					1.0	1.0		

Cycle Length: 115.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	690	1770	1.04	0.39	81.2	F		
LTR	726	1863	0.00	0.39	21.4	C	106.4	F
R	617	1583	1.18	0.39	131.4	F		
Westbound								
Northbound								
T	2661	5074	1.00	0.52	45.5	D	33.6	C
R	1583	1583	0.61	1.00	0.7	A		
Southbound								
T	2661	5074	0.53	0.52	18.2	B	13.8	B
R	1583	1583	0.29	1.00	0.1	A		

Intersection Delay = 43.4 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	PM Peak Hour
Intersection:	Jamboree at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-5 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	684	0	691					2536	915		1344	434
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	180	0	182					667	241		354	114
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	720	0	727					2669	963		1415	457
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	44.8	0.0			34.7	20.3	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 115.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	684	0	691					2536	915		1344	434
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	720	0	727					2669	963		1415	457
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR R					T	R		T	R
Adj flow	720	0	727					2669	963		1415	457
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound							Northbound							Southbound						
LG	L		LTR	R											T	R						T	R				
So	1900		1900	1900											1900	1900						1900	1900				
Lanes	1		1		0		0		0		0				3	1		0				3	1				
fW	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fHV	0.980		0.980	0.980											0.980	0.980						0.980	0.980				
fG	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fP	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fBB	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fA	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fLU	1.000		1.000	1.000											0.908	1.000						0.908	1.000				
fRT			1.000	0.850											1.000	0.850						1.000	0.850				
fLT	0.950		1.000												1.000							1.000					
Sec.																											
fLpb	1.000		1.000												1.000							1.000					
fRpb			1.000	1.000											1.000	1.000						1.000	1.000				
S	1770		1863	1583											5074	1583						5074	1583				
Sec.																											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	720	1770		0.41	0.39	690	1.04
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.39	726	0.00
Right	R	727	1583	#	0.46	0.39	617	1.18
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2669	5074	#	0.53	0.52	2661	1.00
Right	R	963	1583		0.61	1.00	1583	0.61
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1415	5074		0.28	0.52	2661	0.53
Right	R	457	1583		0.29	1.00	1583	0.29

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.99
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.08

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.04	0.39	35.1	1.000	690	0.50	46.1	0.0	81.2	F		
LTR	0.00	0.39	21.4	1.000	726	0.11	0.0	0.0	21.4	C	106.4	F
R	1.18	0.39	35.1	1.000	617	0.50	96.3	0.0	131.4	F		
Westbound												
Northbound												
T	1.00	0.52	27.3	1.000	2661	0.50	18.2	0.0	45.5	D	33.6	C
R	0.61	1.00	0.0	0.950	1583	0.19	0.7	0.0	0.7	A		
Southbound												

T	0.53	0.52	18.0	1.000	2661	0.13	0.2	0.0	18.2	B	13.8	B
R	0.29	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 43.4 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 115.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 115.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	115.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	35.1	35.1	0.00	7.5	0.0	81.2

LTR	0.0	0.00	35.1	21.4	0.00	0.0	0.0	21.4
R	0.0	0.00	35.1	35.1	0.00	27.5	0.0	131.4
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	27.3	27.3	0.00	2.0	0.0	45.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.7
Southbound								
	0.0						0.0	
T	0.0	0.00	27.3	18.0	0.00	0.0	0.0	18.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 43.4 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	720	0	727				979	963		519	457	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	3	1	0	3	1	
SL	1770	1863	1583				1862	1583		1862	1583	
LnCapacity	690	726	617				976	1583		976	1583	
Flow Ratio	0.4	0.0	0.5				0.5	0.6		0.3	0.3	
v/c Ratio	1.04	0.00	1.18				1.00	0.61		0.53	0.29	
Grn Ratio	0.39	0.39	0.39				0.52	1.00		0.52	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	23.0	0.0	23.2				31.3			10.9		
kB	0.6	0.7	0.6				0.8	1.1		0.8	1.1	
Q2	9.7	0.0	17.0				10.0	1.6		0.9	0.4	
Q Average	32.7	0.0	40.2				41.3			11.8		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.1				1.1			1.2		
BOQ	37.4	0.0	45.7				46.9			13.9		
QSRatio												
85th Percentile Output:												
fB%	1.4	1.6	1.4				1.4			1.5		
BOQ	45.8	0.0	55.4				56.8			17.8		
QSRatio												
90th Percentile Output:												
fB%	1.5	1.8	1.5				1.5			1.6		
BOQ	48.3	0.0	58.4				59.9			19.2		
QSRatio												
95th Percentile Output:												
fB%	1.6	2.1	1.6				1.6			1.8		
BOQ	52.2	0.0	62.9				64.4			21.4		
QSRatio												
98th Percentile Output:												
fB%	1.8	2.7	1.7				1.7			2.1		
BOQ	58.2	0.0	70.1				71.9			24.8		
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-5 NB Ramps

Inter.: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	103	0	137				309	945			1828	62
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right	A				WB Right				
Green	7.7	0.0				8.6	4.9	17.9	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	227	1770	0.48	0.13	25.8	C		
LTR	239	1863	0.00	0.13	22.8	C	31.6	C
R	203	1583	0.71	0.13	36.0	D		
Westbound								
Northbound								
L	493	3437	0.66	0.14	27.6	C		
T	3501	5074	0.28	0.69	3.6	A	9.5	A
Southbound								
T	2419	5074	0.80	0.48	15.2	B	14.7	B
R	1583	1583	0.04	1.00	0.0+	A		

Intersection Delay = 14.0 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Tustin Ranch at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-5 NB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	103	0	137				309	945			1828	62
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	27	0	36				81	249			481	16
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	108	0	144				325	995			1924	65
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru	A	A	A
Right		A			Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right		A			WB Right			
Green		7.7	0.0			8.6	4.9	17.9	0.0
Yellow		3.6				3.2	4.3	4.3	
All Red		1.5				1.0	1.5	1.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	103	0	137				309	945			1828	62
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	108	0	144				325	995			1924	65
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	108	0	144				325	995			1924	65
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	108	1770		0.06	0.13	227	0.48
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.13	239	0.00
Right	R	144	1583	#	0.09	0.13	203	0.71
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	325	3437	#	0.09	0.14	493	0.66
Prot								
Perm								
Thru	T	995	5074		0.20	0.69	3501	0.28
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1924	5074	#	0.38	0.48	2419	0.80
Right	R	65	1583		0.04	1.00	1583	0.04

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.56
Total lost time per cycle, L = 15.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.75

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.48	0.13	24.3	1.000	227	0.11	1.6	0.0	25.8	C		
LTR	0.00	0.13	22.8	1.000	239	0.11	0.0	0.0	22.8	C	31.6	C
R	0.71	0.13	25.1	1.000	203	0.27	10.9	0.0	36.0	D		
Westbound												
Northbound												
L	0.66	0.14	24.3	1.000	493	0.23	3.2	0.0	27.6	C		
T	0.28	0.69	3.6	1.000	3501	0.11	0.0	0.0	3.6	A	9.5	A
Southbound												

T	0.80	0.48	13.2	1.000	2419	0.34	1.9	0.0	15.2	B	14.7	B
R	0.04	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		

Intersection delay = 14.0 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	26.1	24.3	0.00	0.0	0.0	25.8

LTR	0.0	0.00	26.1	22.8	0.00	0.0	0.0	22.8
R	0.0	0.00	26.1	25.1	0.00	0.0	0.0	36.0
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	25.7	24.3	0.00	0.0	0.0	27.6
T	0.0	0.00	9.3	3.6	0.00	0.0	0.0	3.6
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	15.7	13.2	0.00	0.0	0.0	15.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+

Intersection Delay 14.0 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	108	0	144				167	365		706	65	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	227	239	203				253	1285		888	1583	
Flow Ratio	0.1	0.0	0.1				0.1	0.2		0.4	0.0	
v/c Ratio	0.48	0.00	0.71				0.66	0.28		0.80	0.04	
Grn Ratio	0.13	0.13	0.13				0.14	0.69		0.48	1.00	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00		
Q1	1.7	0.0	2.3				2.6	2.3		9.9		
kB	0.2	0.2	0.2				0.2	0.6		0.5	0.7	
Q2	0.2	0.0	0.5				0.4	0.2		1.8	0.0	
Q Average	1.9	0.0	2.8				3.1	2.6		11.7		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.2		
BOQ	2.2	0.0	3.3				3.7	3.1		13.8		
QSRatio												
85th Percentile Output:												
fB%	1.6	1.6	1.6				1.6	1.6		1.5		
BOQ	3.0	0.0	4.4				4.8	4.1		17.6		
QSRatio												
90th Percentile Output:												
fB%	1.8	1.8	1.7				1.7	1.8		1.6		
BOQ	3.3	0.0	4.9				5.4	4.5		19.0		
QSRatio												
95th Percentile Output:												
fB%	2.0	2.1	2.0				2.0	2.0		1.8		
BOQ	3.8	0.0	5.6				6.2	5.2		21.3		
QSRatio												
98th Percentile Output:												
fB%	2.6	2.7	2.5				2.5	2.5		2.1		
BOQ	4.8	0.0	7.0				7.7	6.5		24.7		
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-5 NB Ramps

Inter.: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	273	0	199				621	1184			698	496
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right	A				WB Right			
Green	13.6	0.0				16.8	4.4	4.3	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	401	1770	0.72	0.23	27.4	C		
LTR	422	1863	0.00	0.23	17.9	B	25.6	C
R	359	1583	0.58	0.23	23.1	C		
Westbound								
Northbound								
L	962	3437	0.68	0.28	21.2	C		
T	3002	5074	0.42	0.59	6.7	A	11.7	B
Southbound								
T	1226	5074	0.60	0.24	21.0	C	12.3	B
R	1583	1583	0.33	1.00	0.1	A		

Intersection Delay = 13.8 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	PM Peak Hour
Intersection:	Tustin Ranch at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-5 NB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	273	0	199				621	1184			698	496
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	72	0	52				163	312			184	131
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	287	0	209				654	1246			735	522
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A						
EB Thru		A						
EB Right		A						
EB Peds								
WB Left								
WB Thru								
WB Right								
WB Peds								
NB Left					A			
NB Thru					A	A	A	
NB Right								
NB Peds								
SB Left								
SB Thru						A	A	
SB Right					A	A	A	
SB Peds								
EB Right								
WB Right								
Green		13.6	0.0		16.8	4.4	4.3	0.0
Yellow		3.6			3.2	4.3	4.3	
All Red		1.5			1.0	1.5	1.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	273	0	199				621	1184			698	496
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	287	0	209				654	1246			735	522
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	287	0	209				654	1246			735	522
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	287	1770	#	0.16	0.23	401	0.72
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.23	422	0.00
Right	R	209	1583		0.13	0.23	359	0.58
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	654	3437	#	0.19	0.28	962	0.68
Prot								
Perm								
Thru	T	1246	5074		0.25	0.59	3002	0.42
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	735	5074	#	0.14	0.24	1226	0.60
Right	R	522	1583		0.33	1.00	1583	0.33

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.50
Total lost time per cycle, L = 15.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.66

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.72	0.23	21.4	1.000	401	0.28	6.0	0.0	27.4	C		
LTR	0.00	0.23	17.9	1.000	422	0.11	0.0	0.0	17.9	B	25.6	C
R	0.58	0.23	20.7	1.000	359	0.17	2.4	0.0	23.1	C		
Westbound												
Northbound												
L	0.68	0.28	19.2	1.000	962	0.25	2.0	0.0	21.2	C		
T	0.42	0.59	6.6	1.000	3002	0.11	0.1	0.0	6.7	A	11.7	B
Southbound												

T	0.60	0.24	20.2	1.000	1226	0.19	0.8	0.0	21.0	C	12.3	B
R	0.33	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 13.8 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	23.2	21.4	0.00	0.0	0.0	27.4

LTR	0.0	0.00	23.2	17.9	0.00	0.0	0.0	17.9
R	0.0	0.00	23.2	20.7	0.00	0.0	0.0	23.1
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	21.6	19.2	0.00	0.0	0.0	21.2
T	0.0	0.00	12.3	6.6	0.00	0.0	0.0	6.7
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	22.8	20.2	0.00	0.0	0.0	21.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 13.8 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	287	0	209				336	457		269	522	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	0	3	1
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	401	422	359				495	1102		450	1583	
Flow Ratio	0.2	0.0	0.1				0.2	0.2		0.1	0.3	
v/c Ratio	0.72	0.00	0.58				0.68	0.41		0.60	0.33	
Grn Ratio	0.23	0.23	0.23				0.28	0.59		0.24	1.00	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00		
Q1	4.4	0.0	3.1				5.0	4.1		4.0		
kB	0.3	0.3	0.3				0.4	0.6		0.3	0.7	
Q2	0.7	0.0	0.4				0.7	0.4		0.5	0.3	
Q Average	5.2	0.0	3.5				5.7	4.5		4.5		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.2		
BOQ	6.1	0.0	4.2				6.8	5.4		5.3		
QSRatio												
85th Percentile Output:												
fB%	1.6	1.6	1.6				1.5	1.6		1.6		
BOQ	8.0	0.0	5.5				8.8	7.1		7.0		
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8	1.7				1.7	1.7		1.7		
BOQ	8.8	0.0	6.1				9.7	7.8		7.7		
QSRatio												
95th Percentile Output:												
fB%	2.0	2.1	2.0				1.9	2.0		2.0		
BOQ	10.1	0.0	7.0				11.0	8.9		8.8		
QSRatio												
98th Percentile Output:												
fB%	2.4	2.7	2.5				2.3	2.4		2.4		
BOQ	12.2	0.0	8.6				13.4	10.9		10.7		
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-5 SB Ramps

Inter.: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L		T			T R
Volume	881	0	681				130	757			1429	539
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	52.4	0.0				5.3	23.8	8.1 0.0
Yellow	3.6					3.2	4.3	4.3
All Red	0.5					0.5	0.5	0.5

Cycle Length: 107.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	867	1770	1.07	0.49	78.1	E		
LTR	912	1863	0.00	0.49	13.9	B	62.5	E
R	775	1583	0.93	0.49	42.4	D		
Westbound								
Northbound								
L	170	3437	0.81	0.05	74.4	E		
T	2167	5074	0.37	0.43	20.9	C	28.8	C
Southbound								
T	1740	5074	0.86	0.34	37.6	D	50.8	D
R	543	1583	1.04	0.34	85.8	F		

Intersection Delay = 50.5 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Tustin Ranch at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-5 SB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	881	0	681				130	757			1429	539
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	232	0	179				34	199			376	142
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	927	0	717				137	797			1504	567
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	52.4	0.0				5.3	23.8	8.1	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 107.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	881	0	681				130	757			1429	539
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	927	0	717				137	797			1504	567
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	927	0	717				137	797			1504	567
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	927	1770	#	0.52	0.49	867	1.07
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.49	912	0.00
Right	R	717	1583		0.45	0.49	775	0.93
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	137	3437	#	0.04	0.05	170	0.81
Prot								
Perm								
Thru	T	797	5074		0.16	0.43	2167	0.37
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1504	5074		0.30	0.34	1740	0.86
Right	R	567	1583	#	0.36	0.34	543	1.04

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.92
Total lost time per cycle, L = 12.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.04

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.07	0.49	27.3	1.000	867	0.50	50.8	0.0	78.1	E		
LTR	0.00	0.49	13.9	1.000	912	0.11	0.0	0.0	13.9	B	62.5	E
R	0.93	0.49	25.5	1.000	775	0.44	16.9	0.0	42.4	D		
Westbound												
Northbound												
L	0.81	0.05	50.3	1.000	170	0.35	24.0	0.0	74.4	E		
T	0.37	0.43	20.8	1.000	2167	0.11	0.1	0.0	20.9	C	28.8	C
Southbound												

T	0.86	0.34	32.8	1.000	1740	0.39	4.8	0.0	37.6	D	50.8	D
R	1.04	0.34	35.2	1.000	543	0.50	50.6	0.0	85.8	F		

Intersection delay = 50.5 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	107.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	107.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	107.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	27.3	27.3	0.00	15.0	0.0	78.1

LTR	0.0	0.00	27.3	13.9	0.00	0.0	0.0	13.9
R	0.0	0.00	27.3	25.5	0.00	0.0	0.0	42.4
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	50.9	50.3	0.00	0.0	0.0	74.4
T	0.0	0.00	30.7	20.8	0.00	0.0	0.0	20.9
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	35.2	32.8	0.00	0.0	0.0	37.6
R	0.0	0.00	35.2	35.2	0.00	6.0	0.0	85.8

Intersection Delay 50.5 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	927	0	717				70	292		552	567	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	0 3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	867	912	775				87	795		638	543	
Flow Ratio	0.5	0.0	0.5				0.0	0.2		0.3	0.4	
v/c Ratio	1.07	0.00	0.93				0.80	0.37		0.87	1.04	
Grn Ratio	0.49	0.49	0.49				0.05	0.43		0.34	0.34	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
Q1	27.6	0.0	19.9				2.1	5.9		15.3	16.9	
kB	0.7	0.7	0.7				0.2	0.7		0.6	0.5	
Q2	13.5	0.0	4.9				0.6	0.4		2.9	7.8	
Q Average	41.1	0.0	24.7				2.6	6.3		18.3	24.7	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.2				1.2	1.2		1.2	1.2	
BOQ	46.7	0.0	28.6				3.1	7.4		21.3	28.5	
QSRatio												
85th Percentile Output:												
fB%	1.4	1.6	1.4				1.6	1.5		1.5	1.4	
BOQ	56.5	0.0	35.4				4.1	9.7		26.7	35.3	
QSRatio												
90th Percentile Output:												
fB%	1.5	1.8	1.5				1.8	1.7		1.6	1.5	
BOQ	59.6	0.0	37.5				4.6	10.6		28.5	37.4	
QSRatio												
95th Percentile Output:												
fB%	1.6	2.1	1.7				2.0	1.9		1.7	1.7	
BOQ	64.1	0.0	40.9				5.3	12.1		31.4	40.8	
QSRatio												
98th Percentile Output:												
fB%	1.7	2.7	1.8				2.5	2.3		1.9	1.8	
BOQ	71.6	0.0	45.8				6.6	14.6		35.5	45.6	
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-5 SB Ramps

Inter.: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	750	0	332				103	1083			623	280
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	31.8	0.0				5.3	5.3	5.2	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	866	1770	0.91	0.49	29.0	C		
LTR	911	1863	0.00	0.49	8.5	A	23.5	C
R	774	1583	0.45	0.49	11.3	B		
Westbound								
Northbound								
L	280	3437	0.39	0.08	29.2	C		
T	1897	5074	0.60	0.37	17.0	B	18.0	B
Southbound								
T	1194	5074	0.55	0.24	22.4	C	26.1	C
R	373	1583	0.79	0.24	34.4	C		

Intersection Delay = 22.2 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	PM Peak Hour
Intersection:	Tustin Ranch at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-5 SB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	750	0	332				103	1083			623	280
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	197	0	87				27	285			164	74
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	789	0	349				108	1140			656	295
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru	A	A	A
Right		A			Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		31.8	0.0			5.3	5.3	5.2	0.0
Yellow		3.6				3.2	4.3	4.3	
All Red		0.5				0.5	0.5	0.5	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	750	0	332				103	1083			623	280
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	789	0	349				108	1140			656	295
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	789	0	349				108	1140			656	295
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	789	1770	#	0.45	0.49	866	0.91
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.49	911	0.00
Right	R	349	1583		0.22	0.49	774	0.45
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	108	3437		0.03	0.08	280	0.39
Prot								
Perm								
Thru	T	1140	5074	#	0.22	0.37	1897	0.60
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	656	5074		0.13	0.24	1194	0.55
Right	R	295	1583		0.19	0.24	373	0.79

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.67
Total lost time per cycle, L = 8.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.78

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.91	0.49	15.3	1.000	866	0.43	13.7	0.0	29.0	C		
LTR	0.00	0.49	8.5	1.000	911	0.11	0.0	0.0	8.5	A	23.5	C
R	0.45	0.49	10.9	1.000	774	0.11	0.4	0.0	11.3	B		
Westbound												
Northbound												
L	0.39	0.08	28.3	1.000	280	0.11	0.9	0.0	29.2	C		
T	0.60	0.37	16.4	1.000	1897	0.19	0.5	0.0	17.0	B	18.0	B
Southbound												

T	0.55	0.24	21.8	1.000	1194	0.15	0.5	0.0	22.4	C	26.1	C
R	0.79	0.24	23.3	1.000	373	0.34	11.0	0.0	34.4	C		

Intersection delay = 22.2 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	65.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	65.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	16.6	15.3	0.00	0.0	0.0	29.0

LTR	0.0	0.00	16.6	8.5	0.00	0.0	0.0	8.5
R	0.0	0.00	16.6	10.9	0.00	0.0	0.0	11.3
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	29.9	28.3	0.00	0.0	0.0	29.2
T	0.0	0.00	20.4	16.4	0.00	0.0	0.0	17.0
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	24.9	21.8	0.00	0.0	0.0	22.4
R	0.0	0.00	24.9	23.3	0.00	0.0	0.0	34.4

Intersection Delay 22.2 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	789	0	349				55	418		240	295	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	0	3	1
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	866	911	774				144	696		438	373	
Flow Ratio	0.4	0.0	0.2				0.0	0.2		0.1	0.2	
v/c Ratio	0.91	0.00	0.45				0.38	0.60		0.55	0.79	
Grn Ratio	0.49	0.49	0.49				0.08	0.37		0.24	0.24	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
Q1	13.1	0.0	4.1				0.9	6.1		3.8	5.0	
kB	0.5	0.5	0.5				0.2	0.5		0.3	0.3	
Q2	3.8	0.0	0.4				0.1	0.7		0.4	1.1	
Q Average	16.9	0.0	4.5				1.1	6.8		4.2	6.1	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.2	1.2	
BOQ	19.8	0.0	5.4				1.3	8.0		5.0	7.2	
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6	1.6				1.6	1.5		1.6	1.5	
BOQ	24.9	0.0	7.1				1.7	10.4		6.6	9.4	
QSRatio												
90th Percentile Output:												
fB%	1.6	1.8	1.7				1.8	1.7		1.7	1.7	
BOQ	26.6	0.0	7.8				1.9	11.4		7.3	10.3	
QSRatio												
95th Percentile Output:												
fB%	1.7	2.1	2.0				2.1	1.9		2.0	1.9	
BOQ	29.4	0.0	8.9				2.2	12.9		8.3	11.7	
QSRatio												
98th Percentile Output:												
fB%	2.0	2.7	2.4				2.6	2.3		2.4	2.3	
BOQ	33.4	0.0	10.9				2.8	15.5		10.2	14.1	
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-5 NB Ramps

Inter.: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
LGConfig				L		LT	R	L	T		T	R
Volume				286	2	247		424	871		1301	603
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	18.5	0.0				25.8	17.7	17.4	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	345	1770	0.87	0.19	58.1	E		
LT	363	1863	0.01	0.19	30.8	C	56.9	E
R	308	1583	0.84	0.19	55.7	E		
Northbound								
L	481	1770	0.93	0.27	58.0	E		
T	3669	5074	0.25	0.72	4.5	A	22.0	C
Southbound								
T	2094	5074	0.65	0.41	23.2	C	33.5	C
R	653	1583	0.97	0.41	55.7	E		

Intersection Delay = 32.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Redhill Ave at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-5 NB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				286	2	247	424	871			1301	603
% Heavy Veh				2	2	2	2	2			2	2
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
PK 15 Vol				75	1	65	112	229			342	159
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900	1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
LGConfig				L		LT	R	L		T			T	R
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0	
Adj Flow				301	2	260	446	917			1369	635
%InSharedLn				0								
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000
Peds Bikes	0				0						0	
Buses				0	0	0	0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Arriv. Type				3	3	3	3	3			3	3
Unit Ext.				3.0	3.0	3.0	3.0	3.0			3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ext of g				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	18.5	0.0				25.8	17.7	17.4	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				286	2	247	424	871			1301	603
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
Adj flow				301	2	260	446	917			1369	635
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
Lane group				L		LT	R	L		T			T	R
Adj flow				301	2	260	446	917			1369	635
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L	LT	R	L	T			T	R	
So			1900	1900	1900	1900	1900			1900	1900	
Lanes	0	0	1	1	1	1	3	0	0	3	1	
fW			1.000	1.000	1.000	1.000	1.000			1.000	1.000	
fHV			0.980	0.980	0.980	0.980	0.980			0.980	0.980	
fG			1.000	1.000	1.000	1.000	1.000			1.000	1.000	
fP			1.000	1.000	1.000	1.000	1.000			1.000	1.000	
fBB			1.000	1.000	1.000	1.000	1.000			1.000	1.000	
fA			1.000	1.000	1.000	1.000	1.000			1.000	1.000	
fLU			1.000	1.000	1.000	1.000	0.908			0.908	1.000	
fRT				1.000	0.850		1.000			1.000	0.850	
fLT			0.950	1.000		0.950	1.000			1.000		
Sec.												
fLpb			1.000	1.000		1.000	1.000			1.000		
fRpb				1.000	1.000		1.000			1.000	1.000	
S			1770	1863	1583	1770	5074			5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	301	1770	#	0.17	0.19	345	0.87
Prot								
Perm								
Thru	LT	2	1863		0.00	0.19	363	0.01
Right	R	260	1583		0.16	0.19	308	0.84
Northbound								
Prot								
Perm								
Left	L	446	1770	#	0.25	0.27	481	0.93
Prot								
Perm								
Thru	T	917	5074		0.18	0.72	3669	0.25
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1369	5074		0.27	0.41	2094	0.65
Right	R	635	1583	#	0.40	0.41	653	0.97

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.82
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.94

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.87	0.19	37.1	1.000	345	0.40	20.9	0.0	58.1	E		
LT	0.01	0.19	30.8	1.000	363	0.11	0.0	0.0	30.8	C	56.9	E
R	0.84	0.19	36.9	1.000	308	0.38	18.9	0.0	55.7	E		
Northbound												
L	0.93	0.27	33.7	1.000	481	0.44	24.3	0.0	58.0	E		
T	0.25	0.72	4.4	1.000	3669	0.11	0.0	0.0	4.5	A	22.0	C
Southbound												

T	0.65	0.41	22.4	1.000	2094	0.23	0.7	0.0	23.2	C	33.5	C
R	0.97	0.41	27.4	1.000	653	0.48	28.3	0.0	55.7	E		

Intersection delay = 32.8 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	38.3	37.1	0.00	0.0	0.0	58.1
LT	0.0	0.00	38.3	30.8	0.00	0.0	0.0	30.8
R	0.0	0.00	38.3	36.9	0.00	0.0	0.0	55.7
Northbound								
L	0.0	0.00	34.6	33.7	0.00	0.0	0.0	58.0
T	0.0	0.00	13.2	4.4	0.00	0.0	0.0	4.5
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	27.9	22.4	0.00	0.0	0.0	23.2
R	0.0	0.00	27.9	27.4	0.00	0.0	0.0	55.7

Intersection Delay 32.8 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound				Southbound		
LaneGroup				L	LT	R	L	T			T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0			0.0	0.0	
Flow Rate				301	2	260	446	336			502	635	
So				1900	1900	1900	1900	1900			1900	1900	
No.Lanes	0	0	0	1	1	1	1	3	0	0	3	1	
SL				1770	1863	1583	1770	1862			1862	1583	
LnCapacity				345	363	308	481	1346			768	653	
Flow Ratio				0.2	0.0	0.2	0.3	0.2			0.3	0.4	
v/c Ratio				0.87	0.01	0.84	0.93	0.25			0.65	0.97	
Grn Ratio				0.19	0.19	0.19	0.27	0.72			0.41	0.41	
I Factor					1.000			1.000			1.000		
AT or PVG				3	3	3	3	3			3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00			1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00			1.00	1.00	
Q1				7.7	0.0	6.6	11.5	3.0			10.7	16.4	
kB				0.4	0.4	0.4	0.5	0.9			0.6	0.6	
Q2				1.9	0.0	1.5	3.3	0.3			1.1	5.6	
Q Average				9.6	0.0	8.1	14.8	3.3			11.8	22.0	
Q Spacing				25.0	25.0	25.0	25.0	25.0			25.0	25.0	
Q Storage				0	0	0	0	0			0	0	
Q S Ratio													
70th Percentile Output:													
fB%				1.2	1.2	1.2	1.2	1.2			1.2	1.2	
BOQ				11.3	0.1	9.6	17.3	3.9			13.8	25.5	
QSRatio													
85th Percentile Output:													
fB%				1.5	1.6	1.5	1.5	1.6			1.5	1.4	
BOQ				14.6	0.1	12.4	21.9	5.1			17.7	31.8	
QSRatio													
90th Percentile Output:													
fB%				1.6	1.8	1.7	1.6	1.7			1.6	1.5	
BOQ				15.8	0.1	13.6	23.5	5.7			19.1	33.8	
QSRatio													
95th Percentile Output:													
fB%				1.9	2.1	1.9	1.8	2.0			1.8	1.7	
BOQ				17.8	0.1	15.3	26.1	6.6			21.3	36.9	
QSRatio													
98th Percentile Output:													
fB%				2.2	2.7	2.2	2.0	2.5			2.1	1.9	
BOQ				20.9	0.1	18.2	29.9	8.1			24.8	41.5	
QSRatio													

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hout
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-5 NB Ramps

Inter.: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
LGConfig				L		LT	R	L	T		T	R
Volume				307	36	402	437	1062			738	300
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left A			
Thru					Thru A	A	A	
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	20.6	0.0			19.8	7.3	6.7	0.0
Yellow	3.2				3.2	3.6	3.6	
All Red	0.5				0.5	0.5	0.5	

Cycle Length: 70.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	521	1770	0.62	0.29	23.6	C		
LT	548	1863	0.07	0.29	17.8	B	35.0-	C
R	466	1583	0.91	0.29	45.2	D		
Northbound								
L	501	1770	0.92	0.28	46.3	D		
T	3015	5074	0.37	0.59	7.5	A	18.8	B
Southbound								
T	1312	5074	0.59	0.26	23.4	C	26.2	C
R	409	1583	0.77	0.26	32.9	C		

Intersection Delay = 24.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	PM Peak Hout
Intersection:	Redhill Ave at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-5 NB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				307	36	402	437	1062			738	300
% Heavy Veh				2	2	2	2	2			2	2
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
PK 15 Vol				81	9	106	115	279			194	79
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900	1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
LGConfig				L		LT	R	L		T			T	R
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0	
Adj Flow				323	38	423	460	1118			777	316
%InSharedLn				0								
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000
Peds Bikes	0				0						0	
Buses				0	0	0	0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Arriv. Type				3	3	3	3	3			3	3
Unit Ext.				3.0	3.0	3.0	3.0	3.0			3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ext of g				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru		A	A
Right		A			Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		20.6	0.0			19.8	7.3	6.7	0.0
Yellow		3.2				3.2	3.6	3.6	
All Red		0.5				0.5	0.5	0.5	

Cycle Length: 70.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				307	36	402	437	1062			738	300
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
Adj flow				323	38	423	460	1118			777	316
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
Lane group				L		LT	R	L		T			T	R
Adj flow				323	38	423	460	1118			777	316
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	LT	R	L	T		T	R	
So				1900	1900	1900	1900	1900		1900	1900	
Lanes	0	0	0	1	1	1	1	3	0	3	1	
fW				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fHV				0.980	0.980	0.980	0.980	0.980		0.980	0.980	
fG				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fP				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fBB				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fA				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fLU				1.000	1.000	1.000	1.000	0.908		0.908	1.000	
fRT					1.000	0.850		1.000		1.000	0.850	
fLT				0.950	1.000		0.950	1.000		1.000		
Sec.												
fLpb				1.000	1.000		1.000	1.000		1.000		
fRpb					1.000	1.000		1.000		1.000	1.000	
S				1770	1863	1583	1770	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	323	1770		0.18	0.29	521	0.62
Prot								
Perm								
Thru	LT	38	1863		0.02	0.29	548	0.07
Right	R	423	1583	#	0.27	0.29	466	0.91
Northbound								
Prot								
Perm								
Left	L	460	1770	#	0.26	0.28	501	0.92
Prot								
Perm								
Thru	T	1118	5074		0.22	0.59	3015	0.37
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	777	5074		0.15	0.26	1312	0.59
Right	R	316	1583	#	0.20	0.26	409	0.77

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.73
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.87

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.62	0.29	21.3	1.000	521	0.20	2.3	0.0	23.6	C		
LT	0.07	0.29	17.8	1.000	548	0.11	0.1	0.0	17.8	B	35.0-	C
R	0.91	0.29	23.8	1.000	466	0.43	21.4	0.0	45.2	D		
Northbound												
L	0.92	0.28	24.3	1.000	501	0.44	22.0	0.0	46.3	D		
T	0.37	0.59	7.4	1.000	3015	0.11	0.1	0.0	7.5	A	18.8	B
Southbound												

T	0.59	0.26	22.7	1.000	1312	0.18	0.7	0.0	23.4	C	26.2	C
R	0.77	0.26	24.0	1.000	409	0.32	8.9	0.0	32.9	C		

Intersection delay = 24.8 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	70.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	70.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	70.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	24.7	21.3	0.00	0.0	0.0	23.6
LT	0.0	0.00	24.7	17.8	0.00	0.0	0.0	17.8
R	0.0	0.00	24.7	23.8	0.00	0.0	0.0	45.2
Northbound								
L	0.0	0.00	25.1	24.3	0.00	0.0	0.0	46.3
T	0.0	0.00	14.2	7.4	0.00	0.0	0.0	7.5
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	25.9	22.7	0.00	0.0	0.0	23.4
R	0.0	0.00	25.9	24.0	0.00	0.0	0.0	32.9

Intersection Delay 24.8 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	LT	R	L	T		T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate				323	38	423	460	410		285	316	
So				1900	1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0	1	1	1	1	3	0	3	1	
SL				1770	1863	1583	1770	1862		1862	1583	
LnCapacity				521	548	466	501	1106		481	409	
Flow Ratio				0.2	0.0	0.3	0.3	0.2		0.2	0.2	
v/c Ratio				0.62	0.07	0.91	0.92	0.37		0.59	0.77	
Grn Ratio				0.29	0.29	0.29	0.28	0.59		0.26	0.26	
I Factor					1.000			1.000		1.000		
AT or PVG				3	3	3	3	3		3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Q1				5.4	0.5	7.9	8.7	4.1		4.9	5.7	
kB				0.4	0.4	0.4	0.4	0.6		0.4	0.3	
Q2				0.6	0.0	2.5	2.8	0.4		0.5	1.1	
Q Average				6.1	0.6	10.4	11.5	4.5		5.4	6.8	
Q Spacing				25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage				0	0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.2	1.2	1.2	1.2	1.2		1.2	1.2	
BOQ				7.2	0.7	12.3	13.5	5.4		6.4	8.0	
QSRatio												
85th Percentile Output:												
fB%				1.5	1.6	1.5	1.5	1.6		1.6	1.5	
BOQ				9.4	0.9	15.8	17.3	7.0		8.4	10.4	
QSRatio												
90th Percentile Output:												
fB%				1.7	1.8	1.6	1.6	1.7		1.7	1.7	
BOQ				10.3	1.0	17.1	18.7	7.8		9.2	11.4	
QSRatio												
95th Percentile Output:												
fB%				1.9	2.1	1.8	1.8	2.0		1.9	1.9	
BOQ				11.7	1.2	19.2	20.9	8.9		10.5	12.9	
QSRatio												
98th Percentile Output:												
fB%				2.3	2.7	2.1	2.1	2.4		2.4	2.3	
BOQ				14.1	1.5	22.4	24.3	10.9		12.7	15.5	
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-5 SB Ramps

Inter.: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caktrans
Year : 2008
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	0	3	1	1	3	0
LGConfig	L		R					T	R	L	T	
Volume	226		457					1055	591	403	1201	
Lane Width	12.0		12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	26.8	0.0			21.2	21.5	9.9	0.0
Yellow	3.2				3.2	3.6	3.6	
All Red	0.5				0.5	0.5	0.5	

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	499	1770	0.48	0.28	29.0	C		
							75.5	E
R	447	1583	1.08	0.28	98.6	F		
Westbound								
Northbound								
T	1896	5074	0.59	0.37	24.3	C	44.6	D
R	592	1583	1.05	0.37	80.7	F		
Southbound								
L	395	1770	1.07	0.22	103.2	F		
T	3226	5074	0.39	0.64	8.5	A	32.3	C

Intersection Delay = 44.9 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Redhill Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caktrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-5 SB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	226	457						1055	591	403	1201	
% Heavy Veh	2	2						2	2	2	2	
PHF	0.95	0.95						0.95	0.95	0.95	0.95	
PK 15 Vol	59	120						278	156	106	316	
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900						1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	1	0	1	0	0	0	0	3	1	1	3	0
LGConfig	L		R					T	R	L	T	
Lane Width	12.0		12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			
Adj Flow	238		481					1111	622	424	1264	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000	0.000		
Peds Bikes	0			0			0					
Buses	0		0					0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0	0.0	0.0	
Arriv. Type	3		3					3	3	3	3	
Unit Ext.	3.0		3.0					3.0	3.0	3.0	3.0	
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0	2.0	2.0	
Ext of g	2.0		2.0					2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru					Thru		A	A
Right		A			Right		A	A
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		26.8	0.0			21.2	21.5	9.9	0.0
Yellow		3.2				3.2	3.6	3.6	
All Red		0.5				0.5	0.5	0.5	

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	226	457						1055	591	403	1201	
PHF	0.95	0.95						0.95	0.95	0.95	0.95	
Adj flow	238	481						1111	622	424	1264	
No. Lanes	1	0	1	0	0	0	0	3	1	1	3	0
Lane group	L		R					T	R	L	T	
Adj flow	238		481					1111	622	424	1264	
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000	0.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound			Southbound	
LG	L		R				T	R	L	T	
So	1900		1900				1900	1900	1900	1900	
Lanes	1	0	1	0	0	0	3	1	1	3	0
fW	1.000		1.000				1.000	1.000	1.000	1.000	
fHV	0.980		0.980				0.980	0.980	0.980	0.980	
fG	1.000		1.000				1.000	1.000	1.000	1.000	
fP	1.000		1.000				1.000	1.000	1.000	1.000	
fBB	1.000		1.000				1.000	1.000	1.000	1.000	
fA	1.000		1.000				1.000	1.000	1.000	1.000	
fLU	1.000		1.000				0.908	1.000	1.000	0.908	
fRT			0.850				1.000	0.850		1.000	
fLT	0.950						1.000		0.950	1.000	
Sec.											
fLpb	1.000						1.000		1.000	1.000	
fRpb			1.000				1.000	1.000		1.000	
S	1770		1583				5074	1583	1770	5074	
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	238	1770		0.13	0.28	499	0.48
Prot								
Perm								
Thru								
Right	R	481	1583	#	0.30	0.28	447	1.08
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1111	5074		0.22	0.37	1896	0.59
Right	R	622	1583	#	0.39	0.37	592	1.05
Southbound								
Prot								
Perm								
Left	L	424	1770	#	0.24	0.22	395	1.07
Prot								
Perm								
Thru	T	1264	5074		0.25	0.64	3226	0.39
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.94
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.07

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.48	0.28	28.3	1.000	499	0.11	0.7	0.0	29.0	C		
											75.5	E
R	1.08	0.28	34.1	1.000	447	0.50	64.5	0.0	98.6	F		
Westbound												
Northbound												
T	0.59	0.37	23.9	1.000	1896	0.18	0.5	0.0	24.3	C	44.6	D
R	1.05	0.37	29.8	1.000	592	0.50	51.0	0.0	80.7	F		
Southbound												
L	1.07	0.22	36.9	1.000	395	0.50	66.3	0.0	103.2	F		

T	0.39	0.64	8.4	1.000	3226	0.11	0.1	0.0	8.5	A	32.3	C

Intersection delay = 44.9 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	34.1	28.3	0.00	0.0	0.0	29.0

	0.0						0.0	
R	0.0	0.00	34.1	34.1	0.00	8.5	0.0	98.6
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	29.8	23.9	0.00	0.0	0.0	24.3
R	0.0	0.00	29.8	29.8	0.00	7.5	0.0	80.7
Southbound								
L	0.0	0.00	36.9	36.9	0.00	7.2	0.0	103.2
T	0.0	0.00	17.3	8.4	0.00	0.0	0.0	8.5
	0.0						0.0	

Intersection Delay 44.9 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	L	T
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	238	481			407	622	424	464
So	1900	1900			1900	1900	1900	1900
No.Lanes	1 0	1	0 0 0		3	1	1	3 0
SL	1770	1583			1862	1583	1770	1862
LnCapacity	499	447			696	592	395	1184
Flow Ratio	0.1	0.3			0.2	0.4	0.2	0.2
v/c Ratio	0.48	1.08			0.58	1.05	1.07	0.39
Grn Ratio	0.28	0.28			0.37	0.37	0.22	0.64
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00	1.00	1.00	1.00
Q1	5.2	12.7			8.6	16.4	11.2	5.9
kB	0.5	0.4			0.6	0.5	0.4	0.8
Q2	0.4	7.7			0.8	8.5	6.8	0.5
Q Average	5.6	20.4			9.4	24.9	18.0	6.4
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2	1.2	1.2	1.2
BOQ	6.7	23.6			11.1	28.7	20.9	7.6
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5			1.5	1.4	1.5	1.5
BOQ	8.7	29.6			14.3	35.7	26.4	9.9
QSRatio								
90th Percentile Output:								
fB%	1.7	1.5			1.7	1.5	1.6	1.7
BOQ	9.6	31.5			15.5	37.8	28.1	10.9
QSRatio								
95th Percentile Output:								
fB%	1.9	1.7			1.9	1.7	1.7	1.9
BOQ	10.9	34.5			17.4	41.1	31.0	12.4
QSRatio								
98th Percentile Output:								
fB%	2.3	1.9			2.2	1.8	2.0	2.3
BOQ	13.2	38.9			20.5	46.0	35.1	14.9
QSRatio								

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-5 SB Ramps

Inter.: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	0	3	1	1	3	0
LGConfig	L		R					T	R	L	T	
Volume	386		325					1111	441	298	746	
Lane Width	12.0		12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	16.8	0.0			12.4	13.4	6.8	0.0
Yellow	3.2				3.2	3.6	3.6	
All Red	0.5				0.5	0.5	0.5	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	457	1770	0.89	0.26	42.0	D		
							39.7	D
R	409	1583	0.84	0.26	36.8	D		
Westbound								
Northbound								
T	1897	5074	0.62	0.37	17.2	B	19.3	B
R	592	1583	0.78	0.37	24.8	C		
Southbound								
L	338	1770	0.93	0.19	57.2	E		
T	3154	5074	0.25	0.62	5.5	A	20.3	C

Intersection Delay = 24.0 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	PM Peak Hour
Intersection:	Redhill Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-5 SB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	386		325					1111	441	298	746	
% Heavy Veh	2		2					2	2	2	2	
PHF	0.95		0.95					0.95	0.95	0.95	0.95	
PK 15 Vol	102		86					292	116	78	196	
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	1	0	1	0	0	0	0	3	1	1	3	0
LGConfig	L		R					T	R	L	T	
Lane Width	12.0		12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			
Adj Flow	406		342					1169	464	314	785	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000	0.000		
Peds Bikes	0			0				0				
Buses	0		0					0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0	0.0	0.0	
Arriv. Type	3		3					3	3	3	3	
Unit Ext.	3.0		3.0					3.0	3.0	3.0	3.0	
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0	2.0	2.0	
Ext of g	2.0		2.0					2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A						
EB Thru								
EB Right		A						
EB Peds								
WB Left								
WB Thru								
WB Right								
WB Peds								
NB Left								
NB Thru						A	A	
NB Right						A	A	
NB Peds								
SB Left					A			
SB Thru					A	A	A	
SB Right								
SB Peds								
EB Right								
WB Right								
Green		16.8	0.0			12.4	13.4	6.8	0.0
Yellow		3.2				3.2	3.6	3.6	
All Red		0.5				0.5	0.5	0.5	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	386		325					1111	441	298	746	
PHF	0.95		0.95					0.95	0.95	0.95	0.95	
Adj flow	406		342					1169	464	314	785	
No. Lanes	1	0	1	0	0	0	0	3	1	1	3	0
Lane group	L		R					T	R	L	T	
Adj flow	406		342					1169	464	314	785	
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000	0.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound			Southbound	
LG	L		R				T	R	L	T	
So	1900		1900				1900	1900	1900	1900	
Lanes	1	0	1	0	0	0	3	1	1	3	0
fW	1.000		1.000				1.000	1.000	1.000	1.000	
fHV	0.980		0.980				0.980	0.980	0.980	0.980	
fG	1.000		1.000				1.000	1.000	1.000	1.000	
fP	1.000		1.000				1.000	1.000	1.000	1.000	
fBB	1.000		1.000				1.000	1.000	1.000	1.000	
fA	1.000		1.000				1.000	1.000	1.000	1.000	
fLU	1.000		1.000				0.908	1.000	1.000	0.908	
fRT			0.850				1.000	0.850		1.000	
fLT	0.950						1.000		0.950	1.000	
Sec.											
fLpb	1.000						1.000		1.000	1.000	
fRpb			1.000				1.000	1.000		1.000	
S	1770		1583				5074	1583	1770	5074	
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	406	1770	#	0.23	0.26	457	0.89
Prot								
Perm								
Thru								
Right	R	342	1583		0.22	0.26	409	0.84
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1169	5074		0.23	0.37	1897	0.62
Right	R	464	1583	#	0.29	0.37	592	0.78
Southbound								
Prot								
Perm								
Left	L	314	1770	#	0.18	0.19	338	0.93
Prot								
Perm								
Thru	T	785	5074		0.15	0.62	3154	0.25
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.70
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.85

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.89	0.26	23.2	1.000	457	0.41	18.8	0.0	42.0	D		
											39.7	D
R	0.84	0.26	22.8	1.000	409	0.37	14.0	0.0	36.8	D		
Westbound												
Northbound												
T	0.62	0.37	16.6	1.000	1897	0.20	0.6	0.0	17.2	B	19.3	B
R	0.78	0.37	18.0	1.000	592	0.33	6.8	0.0	24.8	C		
Southbound												
L	0.93	0.19	25.9	1.000	338	0.44	31.3	0.0	57.2	E		

T	0.25	0.62	5.5	1.000	3154	0.11	0.0	0.0	5.5	A	20.3	C

Intersection delay = 24.0 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	24.1	23.2	0.00	0.0	0.0	42.0

	0.0						0.0	
R	0.0	0.00	24.1	22.8	0.00	0.0	0.0	36.8
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	20.4	16.6	0.00	0.0	0.0	17.2
R	0.0	0.00	20.4	18.0	0.00	0.0	0.0	24.8
Southbound								
L	0.0	0.00	26.3	25.9	0.00	0.0	0.0	57.2
T	0.0	0.00	12.3	5.5	0.00	0.0	0.0	5.5
	0.0						0.0	

Intersection Delay 24.0 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	L	T
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	406	342			429	464	314	288
So	1900	1900			1900	1900	1900	1900
No.Lanes	1 0	1	0 0 0		3	1	1	3 0
SL	1770	1583			1862	1583	1770	1862
LnCapacity	457	409			696	592	338	1157
Flow Ratio	0.2	0.2			0.2	0.3	0.2	0.2
v/c Ratio	0.89	0.84			0.62	0.78	0.93	0.25
Grn Ratio	0.26	0.26			0.37	0.37	0.19	0.62
I Factor	1.000				1.000			1.000
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00	1.00	1.00	1.00
Q1	7.1	5.8			6.3	7.4	5.6	2.3
kB	0.4	0.3			0.5	0.4	0.3	0.6
Q2	2.1	1.4			0.7	1.4	2.2	0.2
Q Average	9.2	7.3			7.0	8.8	7.8	2.5
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2	1.2	1.2	1.2
BOQ	10.8	8.6			8.3	10.4	9.2	3.0
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5			1.5	1.5	1.5	1.6
BOQ	14.0	11.2			10.8	13.4	11.9	4.0
QSRatio								
90th Percentile Output:								
fB%	1.7	1.7			1.7	1.7	1.7	1.8
BOQ	15.2	12.2			11.8	14.6	13.0	4.4
QSRatio								
95th Percentile Output:								
fB%	1.9	1.9			1.9	1.9	1.9	2.0
BOQ	17.1	13.8			13.4	16.4	14.7	5.1
QSRatio								
98th Percentile Output:								
fB%	2.2	2.3			2.3	2.2	2.2	2.5
BOQ	20.1	16.5			16.0	19.4	17.5	6.4
QSRatio								

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-5 SB Ramps

Inter.: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Newport Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	0	1	0	2	1	1	2	0
LGConfig	L	LT	R	L		R		T	R	L	T	
Volume	369	77	326	29		110		860	63	176	1094	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	7.3	19.9	0.0		12.1	5.4	12.1	0.0
Yellow	3.6	3.6			3.2	3.9	3.9	
All Red	1.0	1.0			1.0	1.0	1.0	

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	440	1770	0.88	0.25	47.4	D		
LT	463	1863	0.17	0.25	23.8	C	45.0	D
R	394	1583	0.87	0.25	47.4	D		
Westbound								
L	162	1770	0.19	0.09	34.2	C		
							57.0	E
R	144	1583	0.81	0.09	63.1	E		
Northbound								
T	993	3547	0.91	0.28	40.1	D	38.9	D
R	443	1583	0.15	0.28	21.8	C		
Southbound								
L	268	1770	0.69	0.15	39.5	D		
T	1716	3547	0.67	0.48	16.8	B	20.0-	B

Intersection Delay = 33.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Newport Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-5 SB Ramps N/S St: Newport Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	369	77	326	29		110		860	63	176	1094	
% Heavy Veh	2	2	2	2		2		2	2	2	2	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol	97	20	86	8		29		226	17	46	288	
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900	1900	1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	1	1	1	1	0	1	0	2	1	1	2	0
LGConfig	L	LT	R	L		R		T	R	L	T	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			
Adj Flow	388	81	343	31		116		905	66	185	1152	
%InSharedLn	0											
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.000	1.000		0.000	
Peds Bikes	0			0			0					
Buses	0	0	0	0		0		0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type	3	3	3	3		3		3	3	3	3	
Unit Ext.	3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0	2.0	2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	7.3	19.9	0.0		12.1	5.4	12.1	0.0
Yellow	3.6	3.6			3.2	3.9	3.9	
All Red	1.0	1.0			1.0	1.0	1.0	

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	369	77	326	29		110		860	63	176	1094	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow	388	81	343	31		116		905	66	185	1152	
No. Lanes	1	1	1	1	0	1	0	2	1	1	2	0
Lane group	L	LT	R	L		R		T	R	L	T	
Adj flow	388	81	343	31		116		905	66	185	1152	
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LT	R	L		R	T	R	L	T		
So	1900	1900	1900	1900		1900	1900	1900	1900	1900		
Lanes	1	1	1	1	0	1	2	1	1	2	0	
fW	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fHV	0.980	0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980		
fG	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fP	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fBB	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fA	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fLU	1.000	1.000	1.000	1.000		1.000	0.952	1.000	1.000	0.952		
fRT		1.000	0.850			0.850	1.000	0.850		1.000		
fLT	0.950	1.000		0.950			1.000		0.950	1.000		
Sec.												
fLpb	1.000	1.000		1.000			1.000		1.000	1.000		
fRpb		1.000	1.000			1.000	1.000	1.000		1.000		
S	1770	1863	1583	1770		1583	3547	1583	1770	3547		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	388	1770	#	0.22	0.25	440	0.88
Prot								
Perm								
Thru	LT	81	1863		0.04	0.25	463	0.17
Right	R	343	1583		0.22	0.25	394	0.87
Westbound								
Prot								
Perm								
Left	L	31	1770		0.02	0.09	162	0.19
Prot								
Perm								
Thru								
Right	R	116	1583	#	0.07	0.09	144	0.81
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	905	3547	#	0.26	0.28	993	0.91
Right	R	66	1583		0.04	0.28	443	0.15
Southbound								
Prot								
Perm								
Left	L	185	1770	#	0.10	0.15	268	0.69
Prot								
Perm								
Thru	T	1152	3547		0.32	0.48	1716	0.67
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.65
Total lost time per cycle, L = 18.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.85

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.88	0.25	28.9	1.000	440	0.41	18.5	0.0	47.4	D		
LT	0.17	0.25	23.6	1.000	463	0.11	0.2	0.0	23.8	C	45.0	D
R	0.87	0.25	28.8	1.000	394	0.40	18.6	0.0	47.4	D		
Westbound												
L	0.19	0.09	33.6	1.000	162	0.11	0.6	0.0	34.2	C		
											57.0	E
R	0.81	0.09	35.7	1.000	144	0.35	27.5	0.0	63.1	E		
Northbound												
T	0.91	0.28	27.8	1.000	993	0.43	12.3	0.0	40.1	D	38.9	D
R	0.15	0.28	21.6	1.000	443	0.11	0.2	0.0	21.8	C		
Southbound												
L	0.69	0.15	32.2	1.000	268	0.26	7.4	0.0	39.5	D		

T 0.67 0.48 15.8 1.000 1716 0.24 1.0 0.0 16.8 B 20.0- B

Intersection delay = 33.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.952	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.952	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	30.1	28.9	0.00	0.0	0.0	47.4

LT	0.0	0.00	30.1	23.6	0.00	0.0	0.0	23.8
R	0.0	0.00	30.1	28.8	0.00	0.0	0.0	47.4
Westbound								
L	0.0	0.00	36.4	33.6	0.00	0.0	0.0	34.2
	0.0						0.0	
R	0.0	0.00	36.4	35.7	0.00	0.0	0.0	63.1
Northbound								
	0.0						0.0	
T	0.0	0.00	28.8	27.8	0.00	0.0	0.0	40.1
R	0.0	0.00	28.8	21.6	0.00	0.0	0.0	21.8
Southbound								
L	0.0	0.00	34.0	32.2	0.00	0.0	0.0	39.5
T	0.0	0.00	20.7	15.8	0.00	0.0	0.0	16.8
	0.0						0.0	

Intersection Delay 33.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup	L	LT	R	L	R	T	R	L	T	
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate	388	81	343	31	116	475	66	185	605	
So	1900	1900	1900	1900	1900	1900	1900	1900	1900	
No.Lanes	1	1	1	1	1	2	1	1	2	0
SL	1770	1863	1583	1770	1583	1862	1583	1770	1862	
LnCapacity	440	463	394	162	144	521	443	268	901	
Flow Ratio	0.2	0.0	0.2	0.0	0.1	0.3	0.0	0.1	0.3	
v/c Ratio	0.88	0.17	0.87	0.19	0.81	0.91	0.15	0.69	0.67	
Grn Ratio	0.25	0.25	0.25	0.09	0.09	0.28	0.28	0.15	0.48	
I Factor		1.000		1.000		1.000			1.000	
AT or PVG	3	3	3	3	3	3	3	3	3	
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
PF2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Q1	8.3	1.4	7.3	0.6	2.5	10.2	1.1	3.9	10.3	
kB	0.4	0.4	0.4	0.2	0.2	0.4	0.4	0.3	0.6	
Q2	2.2	0.1	1.9	0.1	0.7	3.0	0.1	0.6	1.2	
Q Average	10.5	1.5	9.2	0.7	3.2	13.2	1.2	4.5	11.5	
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage	0	0	0	0	0	0	0	0	0	
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
BOQ	12.3	1.8	10.9	0.8	3.8	15.4	1.4	5.4	13.5	
QSRatio										
85th Percentile Output:										
fB%	1.5	1.6	1.5	1.6	1.6	1.5	1.6	1.6	1.5	
BOQ	15.9	2.4	14.0	1.1	5.1	19.7	1.9	7.0	17.3	
QSRatio										
90th Percentile Output:										
fB%	1.6	1.8	1.7	1.8	1.7	1.6	1.8	1.7	1.6	
BOQ	17.2	2.7	15.2	1.2	5.6	21.2	2.1	7.8	18.7	
QSRatio										
95th Percentile Output:										
fB%	1.8	2.1	1.9	2.1	2.0	1.8	2.1	2.0	1.8	
BOQ	19.2	3.1	17.1	1.4	6.5	23.6	2.4	8.9	20.9	
QSRatio										
98th Percentile Output:										
fB%	2.1	2.6	2.2	2.6	2.5	2.1	2.6	2.4	2.1	
BOQ	22.5	3.9	20.2	1.8	8.0	27.2	3.1	10.9	24.3	
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-5 SB Ramps

Inter.: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Newport Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	0	1	0	2	1	1	2	0
LGConfig	L	LT	R	L		R		T	R	L	T	
Volume	369	77	326	29		110		860	63	176	1094	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	7.3	19.9	0.0		12.1	5.4	12.1	0.0
Yellow	3.6	3.6			3.2	3.9	3.9	
All Red	1.0	1.0			1.0	1.0	1.0	

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	440	1770	0.88	0.25	47.4	D		
LT	463	1863	0.17	0.25	23.8	C	45.0	D
R	394	1583	0.87	0.25	47.4	D		
Westbound								
L	162	1770	0.19	0.09	34.2	C		
							57.0	E
R	144	1583	0.81	0.09	63.1	E		
Northbound								
T	993	3547	0.91	0.28	40.1	D	38.9	D
R	443	1583	0.15	0.28	21.8	C		
Southbound								
L	268	1770	0.69	0.15	39.5	D		
T	1716	3547	0.67	0.48	16.8	B	20.0-	B

Intersection Delay = 33.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Newport Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-5 SB Ramps N/S St: Newport Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	369	77	326	29		110		860	63	176	1094	
% Heavy Veh	2	2	2	2		2		2	2	2	2	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol	97	20	86	8		29		226	17	46	288	
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900	1900	1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	1	1	1	1	0	1	0	2	1	1	2	0
LGConfig	L	LT	R	L		R		T	R	L	T	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			
Adj Flow	388	81	343	31		116		905	66	185	1152	
%InSharedLn	0											
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.000	1.000		0.000	
Peds Bikes	0			0			0					
Buses	0	0	0	0		0		0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type	3	3	3	3		3		3	3	3	3	
Unit Ext.	3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0	2.0	2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	7.3	19.9	0.0		12.1	5.4	12.1	0.0
Yellow	3.6	3.6			3.2	3.9	3.9	
All Red	1.0	1.0			1.0	1.0	1.0	

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	369	77	326	29		110		860	63	176	1094	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow	388	81	343	31		116		905	66	185	1152	
No. Lanes	1	1	1	1	0	1	0	2	1	1	2	0
Lane group	L	LT	R	L		R		T	R	L	T	
Adj flow	388	81	343	31		116		905	66	185	1152	
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LT	R	L		R	T	R	L	T		
So	1900	1900	1900	1900		1900	1900	1900	1900	1900		
Lanes	1	1	1	1	0	1	2	1	1	2	0	
fW	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fHV	0.980	0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980		
fG	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fP	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fBB	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fA	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fLU	1.000	1.000	1.000	1.000		1.000	0.952	1.000	1.000	0.952		
fRT		1.000	0.850			0.850	1.000	0.850		1.000		
fLT	0.950	1.000		0.950			1.000		0.950	1.000		
Sec.												
fLpb	1.000	1.000		1.000			1.000		1.000	1.000		
fRpb		1.000	1.000			1.000	1.000	1.000		1.000		
S	1770	1863	1583	1770		1583	3547	1583	1770	3547		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	388	1770	#	0.22	0.25	440	0.88
Prot								
Perm								
Thru	LT	81	1863		0.04	0.25	463	0.17
Right	R	343	1583		0.22	0.25	394	0.87
Westbound								
Prot								
Perm								
Left	L	31	1770		0.02	0.09	162	0.19
Prot								
Perm								
Thru								
Right	R	116	1583	#	0.07	0.09	144	0.81
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	905	3547	#	0.26	0.28	993	0.91
Right	R	66	1583		0.04	0.28	443	0.15
Southbound								
Prot								
Perm								
Left	L	185	1770	#	0.10	0.15	268	0.69
Prot								
Perm								
Thru	T	1152	3547		0.32	0.48	1716	0.67
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.65
Total lost time per cycle, L = 18.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.85

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.88	0.25	28.9	1.000	440	0.41	18.5	0.0	47.4	D		
LT	0.17	0.25	23.6	1.000	463	0.11	0.2	0.0	23.8	C	45.0	D
R	0.87	0.25	28.8	1.000	394	0.40	18.6	0.0	47.4	D		
Westbound												
L	0.19	0.09	33.6	1.000	162	0.11	0.6	0.0	34.2	C		
											57.0	E
R	0.81	0.09	35.7	1.000	144	0.35	27.5	0.0	63.1	E		
Northbound												
T	0.91	0.28	27.8	1.000	993	0.43	12.3	0.0	40.1	D	38.9	D
R	0.15	0.28	21.6	1.000	443	0.11	0.2	0.0	21.8	C		
Southbound												
L	0.69	0.15	32.2	1.000	268	0.26	7.4	0.0	39.5	D		

T 0.67 0.48 15.8 1.000 1716 0.24 1.0 0.0 16.8 B 20.0- B

Intersection delay = 33.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.952	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.952	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	30.1	28.9	0.00	0.0	0.0	47.4

LT	0.0	0.00	30.1	23.6	0.00	0.0	0.0	23.8
R	0.0	0.00	30.1	28.8	0.00	0.0	0.0	47.4
Westbound								
L	0.0	0.00	36.4	33.6	0.00	0.0	0.0	34.2
	0.0						0.0	
R	0.0	0.00	36.4	35.7	0.00	0.0	0.0	63.1
Northbound								
	0.0						0.0	
T	0.0	0.00	28.8	27.8	0.00	0.0	0.0	40.1
R	0.0	0.00	28.8	21.6	0.00	0.0	0.0	21.8
Southbound								
L	0.0	0.00	34.0	32.2	0.00	0.0	0.0	39.5
T	0.0	0.00	20.7	15.8	0.00	0.0	0.0	16.8
	0.0						0.0	

Intersection Delay 33.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup	L	LT	R	L	R	T	R	L	T	
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate	388	81	343	31	116	475	66	185	605	
So	1900	1900	1900	1900	1900	1900	1900	1900	1900	
No.Lanes	1	1	1	1	1	2	1	1	2	0
SL	1770	1863	1583	1770	1583	1862	1583	1770	1862	
LnCapacity	440	463	394	162	144	521	443	268	901	
Flow Ratio	0.2	0.0	0.2	0.0	0.1	0.3	0.0	0.1	0.3	
v/c Ratio	0.88	0.17	0.87	0.19	0.81	0.91	0.15	0.69	0.67	
Grn Ratio	0.25	0.25	0.25	0.09	0.09	0.28	0.28	0.15	0.48	
I Factor		1.000		1.000		1.000			1.000	
AT or PVG	3	3	3	3	3	3	3	3	3	
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
PF2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Q1	8.3	1.4	7.3	0.6	2.5	10.2	1.1	3.9	10.3	
kB	0.4	0.4	0.4	0.2	0.2	0.4	0.4	0.3	0.6	
Q2	2.2	0.1	1.9	0.1	0.7	3.0	0.1	0.6	1.2	
Q Average	10.5	1.5	9.2	0.7	3.2	13.2	1.2	4.5	11.5	
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage	0	0	0	0	0	0	0	0	0	
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
BOQ	12.3	1.8	10.9	0.8	3.8	15.4	1.4	5.4	13.5	
QSRatio										
85th Percentile Output:										
fB%	1.5	1.6	1.5	1.6	1.6	1.5	1.6	1.6	1.5	
BOQ	15.9	2.4	14.0	1.1	5.1	19.7	1.9	7.0	17.3	
QSRatio										
90th Percentile Output:										
fB%	1.6	1.8	1.7	1.8	1.7	1.6	1.8	1.7	1.6	
BOQ	17.2	2.7	15.2	1.2	5.6	21.2	2.1	7.8	18.7	
QSRatio										
95th Percentile Output:										
fB%	1.8	2.1	1.9	2.1	2.0	1.8	2.1	2.0	1.8	
BOQ	19.2	3.1	17.1	1.4	6.5	23.6	2.4	8.9	20.9	
QSRatio										
98th Percentile Output:										
fB%	2.1	2.6	2.2	2.6	2.5	2.1	2.6	2.4	2.1	
BOQ	22.5	3.9	20.2	1.8	8.0	27.2	3.1	10.9	24.3	
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-405 NB Ramps

Inter.: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Volume				654		438		659	555		1014	926
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		23.6	0.0			10.2	4.5	0.0
Yellow		4.3				4.3	3.6	
All Red		3.5				3.5	2.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1352	3437	0.51	0.39	14.1	B		
							16.6	B
R	623	1583	0.74	0.39	20.3	C		
Northbound								
T	1903	5074	0.36	0.38	13.7	B	7.5	A
R	1583	1583	0.37	1.00	0.1	A		
Southbound								
T	1903	5074	0.56	0.38	15.2	B	8.3	A
R	1583	1583	0.62	1.00	0.7	A		

Intersection Delay = 10.2 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Culver at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-405 NB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				654		438		659	555		1014	926
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				172		115		173	146		267	244
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				688		461		694	584		1067	975
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		23.6	0.0			10.2	4.5	0.0
Yellow		4.3				4.3	3.6	
All Red		3.5				3.5	2.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				654		438		659	555		1014	926
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				688		461		694	584		1067	975
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
Lane group				L		R		T	R		T	R
Adj flow				688		461		694	584		1067	975
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T	R		T	R	
So			1900		1900		1900	1900		1900	1900	
Lanes	0	0	2	0	1	0	3	1	0	3	1	
fW			1.000		1.000		1.000	1.000		1.000	1.000	
fHV			0.980		0.980		0.980	0.980		0.980	0.980	
fG			1.000		1.000		1.000	1.000		1.000	1.000	
fP			1.000		1.000		1.000	1.000		1.000	1.000	
fBB			1.000		1.000		1.000	1.000		1.000	1.000	
fA			1.000		1.000		1.000	1.000		1.000	1.000	
fLU			0.971		1.000		0.908	1.000		0.908	1.000	
fRT					0.850		1.000	0.850		1.000	0.850	
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000	1.000		1.000	1.000	
S			3437		1583		5074	1583		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Westbound							
Prot							
Perm							
Left	L	688	3437	0.20	0.39	1352	0.51
Prot							
Perm							
Thru							
Right	R	461	1583	0.29	0.39	623	0.74
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	694	5074	0.14	0.38	1903	0.36
Right	R	584	1583	0.37	1.00	1583	0.37
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1067	5074	0.21	0.38	1903	0.56
Right	R	975	1583	# 0.62	1.00	1583	0.62

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.62
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.62

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.51	0.39	13.8	1.000	1352	0.12	0.3	0.0	14.1	B		
											16.6	B
R	0.74	0.39	15.6	1.000	623	0.30	4.7	0.0	20.3	C		
Northbound												
T	0.36	0.38	13.6	1.000	1903	0.11	0.1	0.0	13.7	B	7.5	A
R	0.37	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.56	0.38	14.8	1.000	1903	0.16	0.4	0.0	15.2	B	8.3	A
R	0.62	1.00	0.0	0.950	1583	0.20	0.7	0.0	0.7	A		

Intersection delay = 10.2 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT				0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	18.2	13.8	0.00	0.0	0.0	14.1
	0.0						0.0	
R	0.0	0.00	18.2	15.6	0.00	0.0	0.0	20.3
Northbound								
	0.0						0.0	
T	0.0	0.00	18.8	13.6	0.00	0.0	0.0	13.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	18.8	14.8	0.00	0.0	0.0	15.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.7

Intersection Delay 10.2 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				354	461	254	584	391	975
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	0 1	0 3	1	0 3	1
SL				1770	1583	1862	1583	1862	1583
LnCapacity				696	623	698	1583	698	1583
Flow Ratio				0.2	0.3	0.1	0.4	0.2	0.6
v/c Ratio				0.51	0.74	0.36	0.37	0.56	0.62
Grn Ratio				0.39	0.39	0.38	1.00	0.38	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00		1.00	
Q1				4.5	6.6	3.1		5.2	
kB				0.4	0.4	0.4	0.7	0.4	0.7
Q2				0.4	1.1	0.2	0.4	0.5	1.1
Q Average				4.9	7.7	3.3		5.7	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2	1.2	1.2		1.2	
BOQ				5.8	9.1	3.9		6.8	
QSRatio									
85th Percentile Output:									
fB%				1.6	1.5	1.6		1.5	
BOQ				7.6	11.8	5.2		8.8	
QSRatio									
90th Percentile Output:									
fB%				1.7	1.7	1.7		1.7	
BOQ				8.4	12.8	5.8		9.7	
QSRatio									
95th Percentile Output:									
fB%				2.0	1.9	2.0		1.9	
BOQ				9.6	14.5	6.6		11.0	
QSRatio									
98th Percentile Output:									
fB%				2.4	2.3	2.5		2.3	
BOQ				11.7	17.3	8.2		13.4	
QSRatio									

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-405 NB Ramps

Inter.: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Volume				469		770		1806	399		968	656
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right	A	A		
Peds					Peds				
NB Right		A			EB Right				
SB Right		A			WB Right				
Green		43.9	0.0			8.4	21.0	0.0	
Yellow		4.3				4.3	3.6		
All Red		3.5				3.5	2.5		

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1588	3437	0.31	0.46	16.2	B		
							63.6	E
R	732	1583	1.11	0.46	92.4	F		
Northbound								
T	1987	5074	0.96	0.39	39.8	D		
R	1583	1583	0.27	1.00				
Southbound								
T	1987	5074	0.51	0.39	22.2	C		
R	1583	1583	0.44	1.00				

Intersection Delay = (sec/veh) Intersection LOS =

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Culver at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-405 NB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				469		770		1806	399		968	656
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				123		203		475	105		255	173
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				494		811		1901	420		1019	691
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		43.9	0.0			8.4	21.0	0.0
Yellow		4.3				4.3	3.6	
All Red		3.5				3.5	2.5	

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				469		770		1806	399		968	656
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				494		811		1901	420		1019	691
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
Lane group				L		R		T	R		T	R
Adj flow				494		811		1901	420		1019	691
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		T		R
So				1900		1900	1900	1900		1900		1900
Lanes	0	0	0	2	0	1	0 3	1	0	3		1
fW				1.000		1.000	1.000	1.000		1.000		1.000
fHV				0.980		0.980	0.980	0.980		0.980		0.980
fG				1.000		1.000	1.000	1.000		1.000		1.000
fP				1.000		1.000	1.000	1.000		1.000		1.000
fBB				1.000		1.000	1.000	1.000		1.000		1.000
fA				1.000		1.000	1.000	1.000		1.000		1.000
fLU				0.971		1.000	0.908	1.000		0.908		1.000
fRT						0.850	1.000	0.850		1.000		0.850
fLT				0.950			1.000			1.000		
Sec.												
fLpb				1.000			1.000			1.000		
fRpb						1.000	1.000	1.000		1.000		1.000
S				3437		1583	5074	1583		5074		1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	494	3437		0.14	0.46	1588	0.31
Prot								
Perm								
Thru								
Right	R	811	1583	#	0.51	0.46	732	1.11
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1901	5074	#	0.37	0.39	1987	0.96
Right	R	420	1583		0.27	1.00	1583	0.27
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1019	5074		0.20	0.39	1987	0.51
Right	R	691	1583		0.44	1.00	1583	0.44

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.89
Total lost time per cycle, L = 13.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.04

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.31	0.46	16.1	1.000	1588	0.11	0.1	0.0	16.2	B		
											63.6	E
R	1.11	0.46	25.5	1.000	732	0.50	66.9	0.0	92.4	F		
Northbound												
T	0.96	0.39	28.1	1.000	1987	0.47	11.7	0.0	39.8	D		
R	0.27	1.00	0.0		1583	0.11	0.1	0.0				
Southbound												

T	0.51	0.39	22.0	1.000	1987	0.12	0.2	0.0	22.2	C
R	0.44	1.00	0.0		1583	0.11	0.2	0.0		

Intersection delay = (sec/veh) Intersection LOS =

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT				0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	25.5	16.1	0.00	0.0	0.0	16.2
	0.0						0.0	
R	0.0	0.00	25.5	25.5	0.00	19.8	0.0	92.4
Northbound								
	0.0						0.0	
T	0.0	0.00	28.9	28.1	0.00	0.0	0.0	39.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	28.9	22.0	0.00	0.0	0.0	22.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	

Intersection Delay sec/veh Intersection LOS

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				254	811	697	420	374	691
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	0 1	0 3	1	0 3	1
SL				1770	1583	1862	1583	1862	1583
LnCapacity				817	732	729	1583	729	1583
Flow Ratio				0.1	0.5	0.4	0.3	0.2	0.4
v/c Ratio				0.31	1.11	0.96	0.27	0.51	0.44
Grn Ratio				0.46	0.46	0.39	1.00	0.39	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00	1.00	1.00	1.00
Q1				4.2	21.4	17.9	0.0	7.5	0.0
kB				0.6	0.6	0.6	0.9	0.6	0.9
Q2				0.3	14.1	5.4	0.3	0.6	0.7
Q Average				4.5	35.5	23.3	0.3	8.1	0.7
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2	1.1	1.2	1.2	1.2	1.2
BOQ				5.3	40.5	27.0	0.4	9.6	0.9
QSRatio									
85th Percentile Output:									
fB%				1.6	1.4	1.4	1.6	1.5	1.6
BOQ				7.0	49.4	33.5	0.5	12.4	1.2
QSRatio									
90th Percentile Output:									
fB%				1.7	1.5	1.5	1.8	1.7	1.8
BOQ				7.7	52.1	35.6	0.6	13.5	1.3
QSRatio									
95th Percentile Output:									
fB%				2.0	1.6	1.7	2.1	1.9	2.1
BOQ				8.8	56.2	38.8	0.7	15.3	1.5
QSRatio									
98th Percentile Output:									
fB%				2.4	1.8	1.9	2.7	2.2	2.6
BOQ				10.8	62.7	43.5	0.9	18.2	1.9
QSRatio									

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-405 SB Ramps

Inter.: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	306	0	526					890	197		1378	251
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	24.4	0.0				4.6	11.3	0.0	
Yellow	3.6					4.3	4.3		
All Red	2.5					2.5	2.5		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	720	1770	0.45	0.41	13.4	B		
LTR	758	1863	0.00	0.41	10.6	B	22.4	C
R	644	1583	0.86	0.41	27.6	C		
Westbound								
Northbound								
T	1920	5074	0.49	0.38	14.4	B	11.8	B
R	1583	1583	0.13	1.00	0.0+	A		
Southbound								
T	1920	5074	0.76	0.38	18.0	B	15.2	B
R	1583	1583	0.17	1.00	0.1	A		

Intersection Delay = 15.9 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Culver at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-405 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	306	0	526					890	197		1378	251
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	81	0	138					234	52		363	66
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	322	0	554					937	207		1451	264
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	24.4	0.0			4.6	11.3	0.0	
Yellow	3.6				4.3	4.3		
All Red	2.5				2.5	2.5		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	306	0	526					890	197		1378	251
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	322	0	554					937	207		1451	264
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	322	0	554					937	207		1451	264
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound				Northbound			Southbound	
LG	L	LTR	R					T	R		T	R
So	1900	1900	1900					1900	1900		1900	1900
Lanes	1	1	1	0	0	0	0	3	1	0	3	1
fW	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980					0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fLU	1.000	1.000	1.000					0.908	1.000		0.908	1.000
fRT		1.000	0.850					1.000	0.850		1.000	0.850
fLT	0.950	1.000						1.000			1.000	
Sec.												
fLpb	1.000	1.000						1.000			1.000	
fRpb		1.000	1.000					1.000	1.000		1.000	1.000
S	1770	1863	1583					5074	1583		5074	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	322	1770		0.18	0.41	720	0.45
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.41	758	0.00
Right	R	554	1583	#	0.35	0.41	644	0.86
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	937	5074		0.18	0.38	1920	0.49
Right	R	207	1583		0.13	1.00	1583	0.13
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1451	5074	#	0.29	0.38	1920	0.76
Right	R	264	1583		0.17	1.00	1583	0.17

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.64
Total lost time per cycle, L = 12.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.81

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.45	0.41	12.9	1.000	720	0.11	0.4	0.0	13.4	B		
LTR	0.00	0.41	10.6	1.000	758	0.11	0.0	0.0	10.6	B	22.4	C
R	0.86	0.41	16.2	1.000	644	0.39	11.4	0.0	27.6	C		
Westbound												
Northbound												
T	0.49	0.38	14.2	1.000	1920	0.11	0.2	0.0	14.4	B	11.8	B
R	0.13	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Southbound												

T	0.76	0.38	16.2	1.000	1920	0.31	1.8	0.0	18.0	B	15.2	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 15.9 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	17.8	12.9	0.00	0.0	0.0	13.4

LTR	0.0	0.00	17.8	10.6	0.00	0.0	0.0	10.6
R	0.0	0.00	17.8	16.2	0.00	0.0	0.0	27.6
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	18.6	14.2	0.00	0.0	0.0	14.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Southbound								
	0.0						0.0	
T	0.0	0.00	18.6	16.2	0.00	0.0	0.0	18.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 15.9 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup	L	LTR	R				T	R	T	R
Init Queue	0.0	0.0	0.0				0.0	0.0	0.0	0.0
Flow Rate	322	0	554				343	207	532	264
So	1900	1900	1900				1900	1900	1900	1900
No.Lanes	1	1	1	0	0	0	3	1	3	1
SL	1770	1863	1583				1862	1583	1862	1583
LnCapacity	720	758	644				704	1583	704	1583
Flow Ratio	0.2	0.0	0.3				0.2	0.1	0.3	0.2
v/c Ratio	0.45	0.00	0.86				0.49	0.13	0.76	0.17
Grn Ratio	0.41	0.41	0.41				0.38	1.00	0.38	1.00
I Factor		1.000					1.000		1.000	
AT or PVG	3	3	3				3	3	3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00				1.00		1.00	
Q1	3.9	0.0	8.4				4.4		7.7	
kB	0.4	0.5	0.4				0.4	0.7	0.4	0.7
Q2	0.4	0.0	2.1				0.4	0.1	1.3	0.1
Q Average	4.2	0.0	10.6				4.8		9.0	
Q Spacing	25.0	25.0	25.0				25.0	25.0	25.0	25.0
Q Storage	0	0	0				0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2	1.2				1.2		1.2	
BOQ	5.1	0.0	12.4				5.7		10.6	
QSRatio										
85th Percentile Output:										
fB%	1.6	1.6	1.5				1.6		1.5	
BOQ	6.6	0.0	16.0				7.4		13.7	
QSRatio										
90th Percentile Output:										
fB%	1.7	1.8	1.6				1.7		1.7	
BOQ	7.3	0.0	17.3				8.2		14.9	
QSRatio										
95th Percentile Output:										
fB%	2.0	2.1	1.8				2.0		1.9	
BOQ	8.4	0.0	19.4				9.4		16.8	
QSRatio										
98th Percentile Output:										
fB%	2.4	2.7	2.1				2.4		2.2	
BOQ	10.3	0.0	22.7				11.4		19.8	
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-405 SB Ramps

Inter.: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L	LTR	R					T	R		T	R
Volume	849	0	526					1393	514		1059	295
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	41.5	0.0				13.4	5.4	0.0	
Yellow	3.6					4.3	4.3		
All Red	2.5					2.5	2.5		

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	918	1770	0.97	0.52	42.1	D		
LTR	966	1863	0.00	0.52	9.3	A	32.3	C
R	821	1583	0.67	0.52	16.5	B		
Westbound								
Northbound								
T	1624	5074	0.90	0.32	33.5	C	24.5	C
R	1583	1583	0.34	1.00	0.1	A		
Southbound								
T	1624	5074	0.69	0.32	24.9	C	19.5	B
R	1583	1583	0.20	1.00	0.1	A		

Intersection Delay = 25.4 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	PM Peak Hour
Intersection:	Culver at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-405 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	849	0	526					1393	514		1059	295
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	223	0	138					367	135		279	78
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	894	0	554					1466	541		1115	311
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		41.5	0.0			13.4	5.4	0.0
Yellow		3.6				4.3	4.3	
All Red		2.5				2.5	2.5	

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	849	0	526					1393	514		1059	295
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	894	0	554					1466	541		1115	311
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR R					T	R		T	R
Adj flow	894	0	554					1466	541		1115	311
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound							Northbound							Southbound						
LG	L		LTR	R											T	R						T	R				
So	1900		1900	1900											1900	1900						1900	1900				
Lanes	1		1	1	0	0	0	0							3	1	0					3	1				
fW	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fHV	0.980		0.980	0.980											0.980	0.980						0.980	0.980				
fG	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fP	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fBB	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fA	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fLU	1.000		1.000	1.000											0.908	1.000						0.908	1.000				
fRT			1.000	0.850											1.000	0.850						1.000	0.850				
fLT	0.950		1.000												1.000							1.000					
Sec.																											
fLpb	1.000		1.000												1.000							1.000					
fRpb			1.000	1.000											1.000	1.000						1.000	1.000				
S	1770		1863	1583											5074	1583						5074	1583				
Sec.																											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	894	1770	#	0.51	0.52	918	0.97
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.52	966	0.00
Right	R	554	1583		0.35	0.52	821	0.67
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1466	5074	#	0.29	0.32	1624	0.90
Right	R	541	1583		0.34	1.00	1583	0.34
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1115	5074		0.22	0.32	1624	0.69
Right	R	311	1583		0.20	1.00	1583	0.20

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.79
Total lost time per cycle, L = 12.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.95

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.97	0.52	18.7	1.000	918	0.48	23.4	0.0	42.1	D		
LTR	0.00	0.52	9.3	1.000	966	0.11	0.0	0.0	9.3	A	32.3	C
R	0.67	0.52	14.3	1.000	821	0.25	2.2	0.0	16.5	B		
Westbound												
Northbound												
T	0.90	0.32	26.0	1.000	1624	0.42	7.5	0.0	33.5	C	24.5	C
R	0.34	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.69	0.32	23.7	1.000	1624	0.26	1.2	0.0	24.9	C	19.5	B
R	0.20	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 25.4 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	80.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	80.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	19.3	18.7	0.00	0.0	0.0	42.1

LTR	0.0	0.00	19.3	9.3	0.00	0.0	0.0	9.3
R	0.0	0.00	19.3	14.3	0.00	0.0	0.0	16.5
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	27.2	26.0	0.00	0.0	0.0	33.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	27.2	23.7	0.00	0.0	0.0	24.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 25.4 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup	L	LTR	R				T	R	T	R
Init Queue	0.0	0.0	0.0				0.0	0.0	0.0	0.0
Flow Rate	894	0	554				538	541	409	311
So	1900	1900	1900				1900	1900	1900	1900
No.Lanes	1	1	1	0	0	0	3	1	3	1
SL	1770	1863	1583				1862	1583	1862	1583
LnCapacity	918	966	821				596	1583	596	1583
Flow Ratio	0.5	0.0	0.3				0.3	0.3	0.2	0.2
v/c Ratio	0.97	0.00	0.67				0.90	0.34	0.69	0.20
Grn Ratio	0.52	0.52	0.52				0.32	1.00	0.32	1.00
I Factor		1.000					1.000		1.000	
AT or PVG	3	3	3				3	3	3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00				1.00		1.00	
Q1	19.3	0.0	9.1				11.4		7.9	
kB	0.6	0.6	0.6				0.5	0.8	0.5	0.8
Q2	6.9	0.0	1.1				3.1	0.4	1.0	0.2
Q Average	26.2	0.0	10.3				14.5		8.9	
Q Spacing	25.0	25.0	25.0				25.0	25.0	25.0	25.0
Q Storage	0	0	0				0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2	1.2				1.2		1.2	
BOQ	30.2	0.0	12.1				17.0		10.5	
QSRatio										
85th Percentile Output:										
fB%	1.4	1.6	1.5				1.5		1.5	
BOQ	37.4	0.0	15.5				21.5		13.6	
QSRatio										
90th Percentile Output:										
fB%	1.5	1.8	1.6				1.6		1.7	
BOQ	39.5	0.0	16.8				23.1		14.8	
QSRatio										
95th Percentile Output:										
fB%	1.6	2.1	1.8				1.8		1.9	
BOQ	43.0	0.0	18.9				25.6		16.6	
QSRatio										
98th Percentile Output:										
fB%	1.8	2.7	2.2				2.0		2.2	
BOQ	48.1	0.0	22.1				29.4		19.6	
QSRatio										

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-405 NB Ramps

Inter.: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Volume				1451		861		1611	494		1599	1623
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right	A	A		
Peds					Peds				
NB Right		A			EB Right				
SB Right		A			WB Right	A	A		
Green		23.4	0.0			9.7	8.9	0.0	
Yellow		3.6				4.7	4.7		
All Red		2.0				1.5	1.5		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1880	4820	0.81	0.39	19.2	B		
							12.2	B
R	1583	1583	0.57	1.00	0.5	A		
Northbound								
T	2097	5074	0.81	0.41	18.0	B	13.8	B
R	1583	1583	0.33	1.00	0.1	A		
Southbound								
T	2796	6765	0.60	0.41	14.1	B	30.8	C
R	1583	1583	1.08	1.00	47.2	D		

Intersection Delay = 20.5 (sec/veh) Intersection LOS = C

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/30/09
Analysis Time Period: AM
Intersection: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2008
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-405 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1451		861		1611	494		1599	1623
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				382		227		424	130		421	427
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				1527		906		1696	520		1683	1708
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right	A	A	
Green		23.4	0.0			9.7	8.9	0.0
Yellow		3.6				4.7	4.7	
All Red		2.0				1.5	1.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1451		861		1611	494		1599	1623
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				1527		906		1696	520		1683	1708
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
Lane group				L		R		T	R		T	R
Adj flow				1527		906		1696	520		1683	1708
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound	
LG				L		R	T	R		T	R
So				1900		1900	1900	1900		1900	1900
Lanes	0	0	0	3	0	1	0 3	1	0	4	1
fW				1.000		1.000	1.000	1.000		1.000	1.000
fHV				0.980		0.980	0.980	0.980		0.980	0.980
fG				1.000		1.000	1.000	1.000		1.000	1.000
fP				1.000		1.000	1.000	1.000		1.000	1.000
fBB				1.000		1.000	1.000	1.000		1.000	1.000
fA				1.000		1.000	1.000	1.000		1.000	1.000
fLU				0.908		1.000	0.908	1.000		0.908	1.000
fRT						0.850	1.000	0.850		1.000	0.850
fLT				0.950			1.000			1.000	
Sec.											
fLpb				1.000			1.000			1.000	
fRpb						1.000	1.000	1.000		1.000	1.000
S				4820		1583	5074	1583		6765	1583
Sec.											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Westbound							
Prot							
Perm							
Left	L	1527	4820	0.32	0.39	1880	0.81
Prot							
Perm							
Thru							
Right	R	906	1583	0.57	1.00	1583	0.57
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1696	5074	0.33	0.41	2097	0.81
Right	R	520	1583	0.33	1.00	1583	0.33
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1683	6765	0.25	0.41	2796	0.60
Right	R	1708	1583	# 1.08	1.00	1583	1.08

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.08
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.08

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor Del k	d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.81	0.39	16.3	1.000	1880	0.35	2.8	0.0	19.2	B		
											12.2	B
R	0.57	1.00	0.0	0.950	1583	0.17	0.5	0.0	0.5	A		
Northbound												
T	0.81	0.41	15.5	1.000	2097	0.35	2.5	0.0	18.0	B	13.8	B
R	0.33	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												
T	0.60	0.41	13.7	1.000	2796	0.19	0.4	0.0	14.1	B	30.8	C

R 1.08 1.00 0.0 0.950 1583 0.50 47.2 0.0 47.2 D

Intersection delay = 20.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				

fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	

	0.0						0.0	
Westbound								
L	0.0	0.00	18.3	16.3	0.00	0.0	0.0	19.2
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.5
Northbound								
	0.0						0.0	
T	0.0	0.00	17.6	15.5	0.00	0.0	0.0	18.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	17.6	13.7	0.00	0.0	0.0	14.1
R	0.0	0.00	0.0	0.0	0.00	31.3	0.0	47.2

Intersection Delay 20.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				560	906	622	520	463	1708
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	3	0 1	0 3	1	0 4	1
SL				1769	1583	1862	1583	1862	1583
LnCapacity				690	1583	769	1583	769	1583
Flow Ratio				0.3	0.6	0.3	0.3	0.2	1.1
v/c Ratio				0.81	0.57	0.81	0.33	0.60	1.08
Grn Ratio				0.39	1.00	0.41	1.00	0.41	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00		1.00		1.00	
Q1				8.3		9.1		6.0	
kB				0.4	0.7	0.5	0.7	0.5	0.7
Q2				1.7	0.9	1.8	0.3	0.7	22.4
Q Average				10.0		10.9		6.7	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2		1.2		1.2	
BOQ				11.8		12.8		8.0	
QSRatio									
85th Percentile Output:									
fB%				1.5		1.5		1.5	
BOQ				15.2		16.5		10.3	
QSRatio									
90th Percentile Output:									
fB%				1.6		1.6		1.7	
BOQ				16.5		17.8		11.3	
QSRatio									
95th Percentile Output:									
fB%				1.8		1.8		1.9	
BOQ				18.5		20.0		12.8	
QSRatio									
98th Percentile Output:									
fB%				2.2		2.1		2.3	
BOQ				21.7		23.3		15.4	
QSRatio									

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-405 NB Ramps

Inter.: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Volume				643		222		3240	899		2231	1144
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right	A	A	
Green	14.6	0.0				20.1	42.3	0.0
Yellow	3.6					4.7	4.7	
All Red	2.0					1.5	1.5	

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	741	4820	0.91	0.15	55.4	E		
							41.2	D
R	1583	1583	0.15	1.00	0.0+	A		
Northbound								
T	3664	5074	0.93	0.72	16.3	B	12.9	B
R	1583	1583	0.60	1.00	0.6	A		
Southbound								
T	4885	6765	0.48	0.72	5.7	A	4.5	A
R	1583	1583	0.76	1.00	2.2	A		

Intersection Delay = 12.4 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	PM Peak Hour
Intersection:	Jamboree at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-405 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				643	222			3240	899		2231	1144
% Heavy Veh				2	2			2	2		2	2
PHF				0.95	0.95			0.95	0.95		0.95	0.95
PK 15 Vol				169	58			853	237		587	301
Hi Ln Vol												
% Grade				0				0			0	
Ideal Sat				1900	1900			1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				677		234		3411	946		2348	1204
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right	A	A	
Green		14.6	0.0			20.1	42.3	0.0
Yellow		3.6				4.7	4.7	
All Red		2.0				1.5	1.5	

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				643	222			3240	899		2231	1144
PHF				0.95	0.95			0.95	0.95		0.95	0.95
Adj flow				677	234			3411	946		2348	1204
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
Lane group				L		R		T	R		T	R
Adj flow				677		234		3411	946		2348	1204
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T	R		T	R	
So			1900		1900		1900	1900		1900	1900	
Lanes	0	0	3	0	1	0	3	1	0	4	1	
fW			1.000		1.000		1.000	1.000		1.000	1.000	
fHV			0.980		0.980		0.980	0.980		0.980	0.980	
fG			1.000		1.000		1.000	1.000		1.000	1.000	
fP			1.000		1.000		1.000	1.000		1.000	1.000	
fBB			1.000		1.000		1.000	1.000		1.000	1.000	
fA			1.000		1.000		1.000	1.000		1.000	1.000	
fLU			0.908		1.000		0.908	1.000		0.908	1.000	
fRT					0.850		1.000	0.850		1.000	0.850	
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000	1.000		1.000	1.000	
S			4820		1583		5074	1583		6765	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group		Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru									
Right									
Westbound									
Prot									
Perm									
Left	L		677	4820	#	0.14	0.15	741	0.91
Prot									
Perm									
Thru									
Right	R		234	1583		0.15	1.00	1583	0.15
Northbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru	T		3411	5074	#	0.67	0.72	3664	0.93
Right	R		946	1583		0.60	1.00	1583	0.60
Southbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru	T		2348	6765		0.35	0.72	4885	0.48
Right	R		1204	1583		0.76	1.00	1583	0.76

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.81
Total lost time per cycle, L = 11.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.93

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.91	0.15	39.6	1.000	741	0.43	15.8	0.0	55.4	E		
											41.2	D
R	0.15	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Northbound												
T	0.93	0.72	11.2	1.000	3664	0.45	5.1	0.0	16.3	B	12.9	B
R	0.60	1.00	0.0	0.950	1583	0.19	0.6	0.0	0.6	A		
Southbound												

T	0.48	0.72	5.6	1.000	4885	0.11	0.1	0.0	5.7	A	4.5	A
R	0.76	1.00	0.0	0.950	1583	0.31	2.2	0.0	2.2	A		

Intersection delay = 12.4 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT				0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	40.2	39.6	0.00	0.0	0.0	55.4
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Northbound								
	0.0						0.0	
T	0.0	0.00	13.2	11.2	0.00	0.0	0.0	16.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.6
Southbound								
	0.0						0.0	
T	0.0	0.00	13.2	5.6	0.00	0.0	0.0	5.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.2

Intersection Delay 12.4 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				248	234	1252	946	646	1204
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	3	0 1	0 3	1	0 4	1
SL				1769	1583	1862	1583	1862	1583
LnCapacity				272	1583	1345	1583	1344	1583
Flow Ratio				0.1	0.1	0.7	0.6	0.3	0.8
v/c Ratio				0.91	0.15	0.93	0.60	0.48	0.76
Grn Ratio				0.15	1.00	0.72	1.00	0.72	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00		1.00		1.00	
Q1				6.4		28.0		7.3	
kB				0.3	0.9	0.9	0.9	0.9	0.9
Q2				2.0	0.2	7.1	1.4	0.8	2.8
Q Average				8.5		35.1		8.0	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2		1.1		1.2	
BOQ				10.0		40.1		9.5	
QSRatio									
85th Percentile Output:									
fB%				1.5		1.4		1.5	
BOQ				12.9		48.9		12.3	
QSRatio									
90th Percentile Output:									
fB%				1.7		1.5		1.7	
BOQ				14.1		51.6		13.4	
QSRatio									
95th Percentile Output:									
fB%				1.9		1.6		1.9	
BOQ				15.9		55.7		15.1	
QSRatio									
98th Percentile Output:									
fB%				2.2		1.8		2.2	
BOQ				18.8		62.1		18.0	
QSRatio									

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: IBC Vision Traffic Study - Exi
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-405 SB Ramps

Inter.: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Volume	822	0	1513					1271	475		2752	271
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	61.3	0.0			7.0	38.3	0.0	
Yellow	3.5				4.7	4.7		
All Red	1.5				2.0	2.0		

Cycle Length: 125.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	868	1770	1.00	0.49	61.4	E		
LTR	914	1863	0.00	0.49	16.2	B	94.0	F
R	1375	2803	1.16	0.49	111.7	F		
Westbound								
Northbound								
T	2814	6765	0.48	0.42	26.7	C	19.5	B
R	1583	1583	0.32	1.00	0.1	A		
Southbound								
T	2814	6765	1.03	0.42	61.6	E	56.1	E
R	1583	1583	0.18	1.00	0.1	A		

Intersection Delay = 59.5 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	IBC Vision Traffic Study - Exi
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-405 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	822	0	1513					1271	475		2752	271
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	216	0	398					334	125		724	71
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L		LTR R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	865	0	1593					1338	500		2897	285
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		61.3	0.0			7.0	38.3	0.0
Yellow		3.5				4.7	4.7	
All Red		1.5				2.0	2.0	

Cycle Length: 125.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	822	0	1513					1271	475		2752	271
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	865	0	1593					1338	500		2897	285
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
Lane group	L		LTR R					T	R		T	R
Adj flow	865	0	1593					1338	500		2897	285
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound				Northbound			Southbound	
LG	L		LTR	R								T	R		T	R
So	1900		1900	1900								1900	1900		1900	1900
Lanes	1		1	2	0	0	0	0				4	1	0	4	1
fW	1.000		1.000	1.000								1.000	1.000		1.000	1.000
fHV	0.980		0.980	0.980								0.980	0.980		0.980	0.980
fG	1.000		1.000	1.000								1.000	1.000		1.000	1.000
fP	1.000		1.000	1.000								1.000	1.000		1.000	1.000
fBB	1.000		1.000	1.000								1.000	1.000		1.000	1.000
fA	1.000		1.000	1.000								1.000	1.000		1.000	1.000
fLU	1.000		1.000	0.885								0.908	1.000		0.908	1.000
fRT			1.000	0.850								1.000	0.850		1.000	0.850
fLT	0.950		1.000									1.000			1.000	
Sec.																
fLpb	1.000		1.000									1.000			1.000	
fRpb			1.000	1.000								1.000	1.000		1.000	1.000
S	1770		1863	2803								6765	1583		6765	1583
Sec.																

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	865	1770		0.49	0.49	868	1.00
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.49	914	0.00
Right	R	1593	2803	#	0.57	0.49	1375	1.16
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1338	6765		0.20	0.42	2814	0.48
Right	R	500	1583		0.32	1.00	1583	0.32
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2897	6765	#	0.43	0.42	2814	1.03
Right	R	285	1583		0.18	1.00	1583	0.18

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.00
Total lost time per cycle, L = 11.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.10

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.00	0.49	31.7	1.000	868	0.50	29.6	0.0	61.4	E		
LTR	0.00	0.49	16.2	1.000	914	0.11	0.0	0.0	16.2	B	94.0	F
R	1.16	0.49	31.8	1.000	1375	0.50	79.9	0.0	111.7	F		
Westbound												
Northbound												
T	0.48	0.42	26.6	1.000	2814	0.11	0.1	0.0	26.7	C	19.5	B
R	0.32	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	1.03	0.42	36.5	1.000	2814	0.50	25.1	0.0	61.6	E	56.1	E
R	0.18	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 59.5 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	125.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	125.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	125.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	31.8	31.7	0.00	0.0	0.0	61.4

LTR	0.0	0.00	31.8	16.2	0.00	0.0	0.0	16.2
R	0.0	0.00	31.8	31.8	0.00	54.5	0.0	111.7
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	36.5	26.6	0.00	0.0	0.0	26.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	36.5	36.5	0.00	20.7	0.0	61.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 59.5 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	865	0	900				368	500		797	285	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	2	0	0	0	0	4	1	0	4	1
SL	1770	1863	1584				1862	1583		1862	1583	
LnCapacity	868	914	776				774	1583		774	1583	
Flow Ratio	0.5	0.0	0.6				0.2	0.3		0.4	0.2	
v/c Ratio	1.00	0.00	1.16				0.48	0.32		1.03	0.18	
Grn Ratio	0.49	0.49	0.49				0.42	1.00		0.42	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	29.9	0.0	31.3				9.3			27.7		
kB	0.8	0.8	0.7				0.7	1.1		0.7	1.1	
Q2	8.9	0.0	19.6				0.6	0.5		10.0	0.2	
Q Average	38.9	0.0	50.9				9.9			37.7		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.1				1.2			1.1		
BOQ	44.2	0.0	57.4				11.7			42.9		
QSRatio												
85th Percentile Output:												
fB%	1.4	1.6	1.4				1.5			1.4		
BOQ	53.7	0.0	69.0				15.1			52.2		
QSRatio												
90th Percentile Output:												
fB%	1.5	1.8	1.4				1.6			1.5		
BOQ	56.7	0.0	72.8				16.3			55.1		
QSRatio												
95th Percentile Output:												
fB%	1.6	2.1	1.5				1.8			1.6		
BOQ	61.0	0.0	78.1				18.4			59.3		
QSRatio												
98th Percentile Output:												
fB%	1.8	2.7	1.7				2.2			1.8		
BOQ	68.1	0.0	87.5				21.5			66.2		
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-405 SB Ramps

Inter.: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Volume	1504	0	608					2549	974		2388	641
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	57.6	0.0				28.9	10.1	0.0	
Yellow	3.5					4.7	4.7		
All Red	1.5					2.0	2.0		

Cycle Length: 115.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	887	1770	1.78	0.50	386.4	F		
LTR	933	1863	0.00	0.50	14.3	B	280.5	F
R	1404	2803	0.46	0.50	18.8	B		
Westbound								
Northbound								
T	2688	6765	1.00	0.40	51.5	D	37.5	D
R	1583	1583	0.65	1.00	0.9	A		
Southbound								
T	2688	6765	0.94	0.40	40.2	D	31.8	C
R	1583	1583	0.43	1.00	0.2	A		

Intersection Delay = 94.7 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	PM Peak Hour
Intersection:	Jamboree at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-405 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	1504	0	608					2549	974		2388	641
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	396	0	160					671	256		628	169
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	1583	0	640					2683	1025		2514	675
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	57.6	0.0			28.9	10.1	0.0	
Yellow	3.5				4.7	4.7		
All Red	1.5				2.0	2.0		

Cycle Length: 115.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	1504	0	608					2549	974		2388	641
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	1583	0	640					2683	1025		2514	675
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	1583	0	640					2683	1025		2514	675
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound			Northbound			Southbound	
LG	L	LTR	R					T	R		T	R
So	1900	1900	1900					1900	1900		1900	1900
Lanes	1	1	2	0	0	0	0	4	1	0	4	1
fW	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980					0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fLU	1.000	1.000	0.885					0.908	1.000		0.908	1.000
fRT		1.000	0.850					1.000	0.850		1.000	0.850
fLT	0.950	1.000						1.000			1.000	
Sec.												
fLpb	1.000	1.000						1.000			1.000	
fRpb		1.000	1.000					1.000	1.000		1.000	1.000
S	1770	1863	2803					6765	1583		6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	1583	1770	#	0.89	0.50	887	1.78
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.50	933	0.00
Right	R	640	2803		0.23	0.50	1404	0.46
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2683	6765	#	0.40	0.40	2688	1.00
Right	R	1025	1583		0.65	1.00	1583	0.65
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2514	6765		0.37	0.40	2688	0.94
Right	R	675	1583		0.43	1.00	1583	0.43

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.29
Total lost time per cycle, L = 11.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.44

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.78	0.50	28.7	1.000	887	0.50	357.7	0.0	386.4	F		
LTR	0.00	0.50	14.3	1.000	933	0.11	0.0	0.0	14.3	B	280.5	F
R	0.46	0.50	18.6	1.000	1404	0.11	0.2	0.0	18.8	B		
Westbound												
Northbound												
T	1.00	0.40	34.6	1.000	2688	0.50	16.9	0.0	51.5	D	37.5	D
R	0.65	1.00	0.0	0.950	1583	0.23	0.9	0.0	0.9	A		
Southbound												

T	0.94	0.40	33.2	1.000	2688	0.45	7.0	0.0	40.2	D	31.8 C
R	0.43	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A	

Intersection delay = 94.7 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 115.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 115.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	115.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	28.7	28.7	0.00	174.0	0.0	386.4

LTR	0.0	0.00	28.7	14.3	0.00	0.0	0.0	14.3
R	0.0	0.00	28.7	18.6	0.00	0.0	0.0	18.8
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	34.6	34.6	0.00	0.0	0.0	51.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.9
Southbound								
	0.0						0.0	
T	0.0	0.00	34.6	33.2	0.00	0.0	0.0	40.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 94.7 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	1583	0	361				738	1025		692	675	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	2	0	0	0	4	1	0	4	1	
SL	1770	1863	1584				1862	1583		1862	1583	
LnCapacity	887	933	793				740	1583		740	1583	
Flow Ratio	0.9	0.0	0.2				0.4	0.6		0.4	0.4	
v/c Ratio	1.78	0.00	0.46				1.00	0.65		0.94	0.43	
Grn Ratio	0.50	0.50	0.50				0.40	1.00		0.40	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	50.6	0.0	7.5				23.5			21.2		
kB	0.7	0.8	0.7				0.7	1.1		0.7	1.1	
Q2	88.7	0.0	0.6				7.7	1.9		5.2	0.8	
Q Average	139.2		0.0	8.0				31.3			26.4	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.2				1.1			1.2		
BOQ	154	0.0	9.5				35.8			30.4		
QSRatio												
85th Percentile Output:												
fB%	1.3	1.6	1.5				1.4			1.4		
BOQ	181	0.0	12.3				43.9			37.6		
QSRatio												
90th Percentile Output:												
fB%	1.4	1.8	1.7				1.5			1.5		
BOQ	195	0.0	13.4				46.4			39.7		
QSRatio												
95th Percentile Output:												
fB%	1.5	2.1	1.9				1.6			1.6		
BOQ	209	0.0	15.1				50.2			43.2		
QSRatio												
98th Percentile Output:												
fB%	1.7	2.7	2.2				1.8			1.8		
BOQ	237	0.0	18.0				56.0			48.3		
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Volume				844		707		1888	242	195	890	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	20.7	0.0			5.0	10.2	5.7	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1095	3437	0.81	0.32	25.1	C		
							26.1	C
R	893	2803	0.83	0.32	27.4	C		
Northbound								
T	2311	6765	0.86	0.34	23.5	C	22.6	C
R	957	2803	0.27	0.34	15.7	B		
Southbound								
L	270	3505	0.76	0.08	41.2	D		
T	3372	6765	0.28	0.50	9.5	A	15.2	B

Intersection Delay = 22.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Macarthur at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				844		707		1888	242	195	890	
% Heavy Veh				2		2		2	2	0	2	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol				222		186		497	64	51	234	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	0	0		2	0	2	0	4	2		2	4	0
LGConfig				L			R		T	R	L		T	
Lane Width				12.0			12.0		12.0	12.0	12.0		12.0	
RTOR Vol							0			0				
Adj Flow				888			744		1987	255	205		937	
%InSharedLn														
Prop LTs									0.000				0.000	
Prop RTs							1.000		0.000	1.000			0.000	
Peds Bikes	0				0				0					
Buses				0			0		0	0	0		0	
%InProtPhase														

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type				3		3		3	3	3	3	
Unit Ext.				3.0		3.0		3.0	3.0	3.0	3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g				2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	20.7	0.0			5.0	10.2	5.7	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				844		707		1888	242	195	890	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow				888		744		1987	255	205	937	
No. Lanes	0	0	0		2	0	2	0	4	2		2	4	0
Lane group				L			R		T	R	L		T	
Adj flow				888			744		1987	255	205		937	
Prop LTs									0.000				0.000	
Prop RTs							1.000		0.000	1.000			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T	R	L	T		
So			1900		1900		1900	1900	1900	1900		
Lanes	0	0	2	0	2	0	4	2	2	4	0	
fW			1.000		1.000		1.000	1.000	1.000	1.000		
fHV			0.980		0.980		0.980	0.980	1.000	0.980		
fG			1.000		1.000		1.000	1.000	1.000	1.000		
fP			1.000		1.000		1.000	1.000	1.000	1.000		
fBB			1.000		1.000		1.000	1.000	1.000	1.000		
fA			1.000		1.000		1.000	1.000	1.000	1.000		
fLU			0.971		0.885		0.908	0.885	0.971	0.908		
fRT					0.850		1.000	0.850		1.000		
fLT			0.950				1.000		0.950	1.000		
Sec.												
fLpb			1.000				1.000		1.000	1.000		
fRpb					1.000		1.000	1.000		1.000		
S			3437		2803		6765	2803	3505	6765		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	888	3437		0.26	0.32	1095	0.81
Prot								
Perm								
Thru								
Right	R	744	2803	#	0.27	0.32	893	0.83
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1987	6765	#	0.29	0.34	2311	0.86
Right	R	255	2803		0.09	0.34	957	0.27
Southbound								
Prot								
Perm								
Left	L	205	3505	#	0.06	0.08	270	0.76
Prot								
Perm								
Thru	T	937	6765		0.14	0.50	3372	0.28
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.62
Total lost time per cycle, L = 17.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.84

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.81	0.32	20.4	1.000	1095	0.35	4.7	0.0	25.1	C		
											26.1	C
R	0.83	0.32	20.5	1.000	893	0.37	6.8	0.0	27.4	C		
Northbound												
T	0.86	0.34	19.9	1.000	2311	0.39	3.5	0.0	23.5	C	22.6	C
R	0.27	0.34	15.5	1.000	957	0.11	0.2	0.0	15.7	B		
Southbound												
L	0.76	0.08	29.4	1.000	270	0.31	11.8	0.0	41.2	D		

T 0.28 0.50 9.5 1.000 3372 0.11 0.0 0.0 9.5 A 15.2 B

Intersection delay = 22.1 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	22.1	20.4	0.00	0.0	0.0	25.1
	0.0						0.0	
R	0.0	0.00	22.1	20.5	0.00	0.0	0.0	27.4
Northbound								
	0.0						0.0	
T	0.0	0.00	21.4	19.9	0.00	0.0	0.0	23.5
R	0.0	0.00	21.4	15.5	0.00	0.0	0.0	15.7
Southbound								
L	0.0	0.00	30.0	29.4	0.00	0.0	0.0	41.2
T	0.0	0.00	16.3	9.5	0.00	0.0	0.0	9.5
	0.0						0.0	

Intersection Delay 22.1 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L		R	T		R	L	T	
Init Queue				0.0		0.0	0.0		0.0	0.0	0.0	
Flow Rate				457		420	547		144	105	257	
So				1900		1900	1900		1900	1900	1900	
No.Lanes	0	0	0	2	0	2	0	4	2	2	4	0
SL				1770		1584	1862		1584	1805	1862	
LnCapacity				563		504	636		540	139	928	
Flow Ratio				0.3		0.3	0.3		0.1	0.1	0.1	
v/c Ratio				0.81		0.83	0.86		0.27	0.76	0.28	
Grn Ratio				0.32		0.32	0.34		0.34	0.08	0.50	
I Factor				1.000			1.000				1.000	
AT or PVG				3		3	3		3	3	3	
Pltn Ratio				1.00		1.00	1.00		1.00	1.00	1.00	
PF2				1.00		1.00	1.00		1.00	1.00	1.00	
Q1				7.6		7.0	9.2		1.9	1.9	2.7	
kB				0.4		0.4	0.4		0.4	0.2	0.5	
Q2				1.6		1.6	2.2		0.1	0.5	0.2	
Q Average				9.1		8.7	11.4		2.0	2.3	2.9	
Q Spacing				25.0		25.0	25.0		25.0	25.0	25.0	
Q Storage				0		0	0		0	0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.2		1.2	1.2		1.2	1.2	1.2	
BOQ				10.8		10.2	13.4		2.4	2.8	3.5	
QSRatio												
85th Percentile Output:												
fB%				1.5		1.5	1.5		1.6	1.6	1.6	
BOQ				13.9		13.2	17.2		3.2	3.7	4.6	
QSRatio												
90th Percentile Output:												
fB%				1.7		1.7	1.6		1.8	1.8	1.7	
BOQ				15.1		14.4	18.6		3.6	4.1	5.1	
QSRatio												
95th Percentile Output:												
fB%				1.9		1.9	1.8		2.0	2.0	2.0	
BOQ				17.0		16.2	20.8		4.1	4.7	5.8	
QSRatio												
98th Percentile Output:												
fB%				2.2		2.2	2.1		2.6	2.5	2.5	
BOQ				20.1		19.2	24.2		5.2	5.9	7.3	
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Volume				553		297		1679	930	597	1368	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	12.7	0.0			14.7	9.8	14.4	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 75.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	582	3437	1.00	0.17	68.5	E		
							55.9	E
R	475	2803	0.66	0.17	32.5	C		
Northbound								
T	2751	6765	0.64	0.41	18.4	B	21.5	C
R	1140	2803	0.86	0.41	27.1	C		
Southbound								
L	687	3505	0.91	0.20	46.4	D		
T	4546	6765	0.32	0.67	5.2	A	17.7	B

Intersection Delay = 25.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	PM Peak Hour
Intersection:	Macarthur at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				553		297		1679	930	597	1368	
% Heavy Veh				2		2		2	2	0	2	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol				146		78		442	245	157	360	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	0	0		2	0	2	0	4	2		2	4	0
LGConfig				L			R		T	R	L		T	
Lane Width				12.0			12.0		12.0	12.0	12.0		12.0	
RTOR Vol						0				0				
Adj Flow				582		313			1767	979	628		1440	
%InSharedLn														
Prop LTs									0.000				0.000	
Prop RTs						1.000		0.000	1.000		0.000			
Peds Bikes	0			0				0						
Buses				0		0			0	0	0		0	
%InProtPhase														

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0			0.0	0.0	0.0			
Arriv. Type				3		3			3	3	3			
Unit Ext.				3.0		3.0			3.0	3.0	3.0			
I Factor					1.000				1.000				1.000	
Lost Time				2.0		2.0			2.0	2.0	2.0			
Ext of g				2.0		2.0			2.0	2.0	2.0			
Ped Min g		3.2			3.2				3.2					

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
WB Left		A			SB Left	A		
Thru					Thru	A	A	A
Right		A			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		12.7	0.0			14.7	9.8	14.4	0.0
Yellow		3.6				3.2	4.3	4.3	
All Red		2.0				2.0	2.0	2.0	

Cycle Length: 75.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				553		297		1679	930	597	1368	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow				582		313		1767	979	628	1440	
No. Lanes	0	0	0		2	0	2	0	4	2		2	4	0
Lane group				L			R		T	R	L		T	
Adj flow				582		313			1767	979	628		1440	
Prop LTs									0.000				0.000	
Prop RTs						1.000		0.000	1.000		0.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R	L	T		
So				1900		1900	1900	1900	1900	1900		
Lanes	0	0	0	2	0	2	0	4	2	2	4	0
fW				1.000		1.000		1.000	1.000	1.000	1.000	
fHV				0.980		0.980		0.980	0.980	1.000	0.980	
fG				1.000		1.000		1.000	1.000	1.000	1.000	
fP				1.000		1.000		1.000	1.000	1.000	1.000	
fBB				1.000		1.000		1.000	1.000	1.000	1.000	
fA				1.000		1.000		1.000	1.000	1.000	1.000	
fLU				0.971		0.885		0.908	0.885	0.971	0.908	
fRT						0.850		1.000	0.850		1.000	
fLT				0.950				1.000		0.950	1.000	
Sec.												
fLpb				1.000				1.000		1.000	1.000	
fRpb						1.000		1.000	1.000		1.000	
S				3437		2803		6765	2803	3505	6765	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	582	3437	#	0.17	0.17	582	1.00
Prot								
Perm								
Thru								
Right	R	313	2803		0.11	0.17	475	0.66
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1767	6765		0.26	0.41	2751	0.64
Right	R	979	2803	#	0.35	0.41	1140	0.86
Southbound								
Prot								
Perm								
Left	L	628	3505	#	0.18	0.20	687	0.91
Prot								
Perm								
Thru	T	1440	6765		0.21	0.67	4546	0.32
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.70
Total lost time per cycle, L = 17.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.90

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.00	0.17	31.1	1.000	582	0.50	37.3	0.0	68.5	E		
											55.9	E
R	0.66	0.17	29.1	1.000	475	0.23	3.4	0.0	32.5	C		
Northbound												
T	0.64	0.41	17.9	1.000	2751	0.22	0.5	0.0	18.4	B	21.5	C
R	0.86	0.41	20.3	1.000	1140	0.39	6.8	0.0	27.1	C		
Southbound												
L	0.91	0.20	29.5	1.000	687	0.43	16.8	0.0	46.4	D		

T 0.32 0.67 5.1 1.000 4546 0.11 0.0 0.0 5.2 A 17.7 B

Intersection delay = 25.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	75.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	31.1	31.1	0.00	0.0	0.0	68.5
	0.0						0.0	
R	0.0	0.00	31.1	29.1	0.00	0.0	0.0	32.5
Northbound								
	0.0						0.0	
T	0.0	0.00	22.3	17.9	0.00	0.0	0.0	18.4
R	0.0	0.00	22.3	20.3	0.00	0.0	0.0	27.1
Southbound								
L	0.0	0.00	30.1	29.5	0.00	0.0	0.0	46.4
T	0.0	0.00	12.3	5.1	0.00	0.0	0.0	5.2
	0.0						0.0	

Intersection Delay 25.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L		R	T		R	L	T	
Init Queue				0.0		0.0	0.0		0.0	0.0	0.0	
Flow Rate				299		176	486		553	323	396	
So				1900		1900	1900		1900	1900	1900	
No.Lanes	0	0	0	2	0	2	0	4	2	2	4	0
SL				1770		1584	1862		1584	1805	1862	
LnCapacity				299		268	757		644	353	1251	
Flow Ratio				0.2		0.1	0.3		0.3	0.2	0.2	
v/c Ratio				1.00		0.66	0.64		0.86	0.92	0.32	
Grn Ratio				0.17		0.17	0.41		0.41	0.20	0.67	
I Factor				1.000			1.000				1.000	
AT or PVG				3		3	3		3	3	3	
Pltn Ratio				1.00		1.00	1.00		1.00	1.00	1.00	
PF2				1.00		1.00	1.00		1.00	1.00	1.00	
Q1				6.2		3.4	8.1		10.5	6.6	3.4	
kB				0.3		0.3	0.5		0.5	0.3	0.7	
Q2				3.3		0.5	0.9		2.4	2.2	0.3	
Q Average				9.6		3.9	9.0		12.9	8.8	3.8	
Q Spacing				25.0		25.0	25.0		25.0	25.0	25.0	
Q Storage				0		0	0		0	0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.2		1.2	1.2		1.2	1.2	1.2	
BOQ				11.3		4.7	10.7		15.1	10.4	4.5	
QSRatio												
85th Percentile Output:												
fB%				1.5		1.6	1.5		1.5	1.5	1.6	
BOQ				14.5		6.2	13.8		19.3	13.5	5.9	
QSRatio												
90th Percentile Output:												
fB%				1.6		1.7	1.7		1.6	1.7	1.7	
BOQ				15.8		6.8	15.0		20.8	14.6	6.5	
QSRatio												
95th Percentile Output:												
fB%				1.9		2.0	1.9		1.8	1.9	2.0	
BOQ				17.7		7.8	16.8		23.1	16.5	7.5	
QSRatio												
98th Percentile Output:												
fB%				2.2		2.4	2.2		2.1	2.2	2.4	
BOQ				20.9		9.6	19.9		26.7	19.5	9.2	
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				1040	254	1102		968	333	196	1119	392
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left								
Thru						A	A	
Right						A	A	
Peds								
WB Left		A						
Thru		A						
Right		A						
Peds								
NB Right								
SB Right								
Green		20.9	0.0			5.4	7.2	4.8	0.0
Yellow		4.0				3.2	4.3	4.3	
All Red		1.5				0.8	1.8	1.8	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1197	3437	0.91	0.35	29.6	C		
T	649	1863	0.41	0.35	15.3	B	15.3	B
R	1583	1583	0.73	1.00	1.8	A		
Northbound								
T	2041	6765	0.50	0.30	17.4	B	19.3	B
R	478	1583	0.73	0.30	24.6	C		
Southbound								
L	309	3437	0.67	0.09	31.8	C		
T	3101	6765	0.38	0.46	10.7	B	13.7	B
R	726	1583	0.57	0.46	13.0	B		

Intersection Delay = 15.7 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/30/09
Analysis Time Period: AM Peak Hour
Intersection: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2008
Project ID: IBC Vision Traffic Study - Existing

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1040	254	1102		968	333	196	1119	392
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				274	67	290		255	88	52	294	103
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L		T	R		T	R	L		T	R
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0
Adj Flow				1095	267	1160		1019	351	206	1178	413
%InSharedLn												
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0	0	0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	20.9	0.0				5.4	7.2	4.8	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1040	254	1102		968	333	196	1119	392
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				1095	267	1160		1019	351	206	1178	413
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
Lane group				L		T	R		T	R	L		T	R
Adj flow				1095	267	1160		1019	351	206	1178	413
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	1095	3437		0.32	0.35	1197	0.91
Prot								
Perm								
Thru	T	267	1863		0.14	0.35	649	0.41
Right	R	1160	1583	#	0.73	1.00	1583	0.73
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1019	6765		0.15	0.30	2041	0.50
Right	R	351	1583		0.22	0.30	478	0.73
Southbound								
Prot								
Perm								
Left	L	206	3437		0.06	0.09	309	0.67
Prot								
Perm								
Thru	T	1178	6765		0.17	0.46	3101	0.38
Right	R	413	1583		0.26	0.46	726	0.57

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.73
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.73

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.91	0.35	18.7	1.000	1197	0.43	10.9	0.0	29.6	C		
T	0.41	0.35	14.9	1.000	649	0.11	0.4	0.0	15.3	B	15.3	B
R	0.73	1.00	0.0	0.950	1583	0.29	1.8	0.0	1.8	A		
Northbound												
T	0.50	0.30	17.2	1.000	2041	0.11	0.2	0.0	17.4	B	19.3	B
R	0.73	0.30	18.8	1.000	478	0.29	5.8	0.0	24.6	C		
Southbound												
L	0.67	0.09	26.4	1.000	309	0.24	5.4	0.0	31.8	C		

T	0.38	0.46	10.7	1.000	3101	0.11	0.1	0.0	10.7	B	13.7	B
R	0.57	0.46	11.9	1.000	726	0.16	1.1	0.0	13.0	B		

Intersection delay = 15.7 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.5	18.7	0.00	0.0	0.0	29.6
T	0.0	0.00	19.5	14.9	0.00	0.0	0.0	15.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.8
Northbound								
	0.0						0.0	
T	0.0	0.00	20.9	17.2	0.00	0.0	0.0	17.4
R	0.0	0.00	20.9	18.8	0.00	0.0	0.0	24.6
Southbound								
L	0.0	0.00	27.3	26.4	0.00	0.0	0.0	31.8
T	0.0	0.00	16.2	10.7	0.00	0.0	0.0	10.7
R	0.0	0.00	16.2	11.9	0.00	0.0	0.0	13.0

Intersection Delay 15.7 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound		
LaneGroup				L	T	R	T	R	L	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				563	267	1160	280	351	106	324	413
So				1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	1	1	4	1	2	4	1
SL				1770	1863	1583	1862	1583	1770	1862	1583
LnCapacity				616	649	1583	561	478	159	853	726
Flow Ratio				0.3	0.1	0.7	0.2	0.2	0.1	0.2	0.3
v/c Ratio				0.91	0.41	0.73	0.50	0.73	0.67	0.38	0.57
Grn Ratio				0.35	0.35	1.00	0.30	0.30	0.09	0.46	0.46
I Factor					1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1				9.0	3.4		3.8	5.2	1.7	3.5	5.0
kB				0.4	0.4	0.7	0.4	0.3	0.2	0.5	0.4
Q2				3.0	0.3	1.9	0.4	0.9	0.3	0.3	0.6
Q Average				11.9	3.7		4.2	6.2	2.1	3.8	5.6
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0	0
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2		1.2	1.2	1.2	1.2	1.2
BOQ				14.0	4.4		5.0	7.3	2.5	4.6	6.7
QSRatio											
85th Percentile Output:											
fB%				1.5	1.6		1.6	1.5	1.6	1.6	1.5
BOQ				17.9	5.8		6.6	9.5	3.2	6.0	8.7
QSRatio											
90th Percentile Output:											
fB%				1.6	1.7		1.7	1.7	1.8	1.7	1.7
BOQ				19.3	6.4		7.3	10.4	3.6	6.6	9.6
QSRatio											
95th Percentile Output:											
fB%				1.8	2.0		2.0	1.9	2.0	2.0	1.9
BOQ				21.6	7.3		8.3	11.9	4.2	7.6	10.9
QSRatio											
98th Percentile Output:											
fB%				2.1	2.5		2.4	2.3	2.6	2.4	2.3
BOQ				25.1	9.0		10.2	14.3	5.2	9.4	13.2
QSRatio											

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
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E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
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Year : 2008
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				633	273	659		1928	650	585	1084	312
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	18.0	0.0				9.3	8.1	7.9	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	952	3437	0.70	0.28	23.4	C		
T	516	1863	0.56	0.28	21.4	C	13.3	B
R	1583	1583	0.44	1.00	0.2	A		
Northbound								
T	2300	6765	0.88	0.34	24.6	C	58.2	E
R	538	1583	1.27	0.34	157.6	F		
Southbound								
L	492	3437	1.25	0.14	157.2	F		
T	3684	6765	0.31	0.54	8.2	A	52.3	D
R	862	1583	0.38	0.54	8.8	A		

Intersection Delay = 44.8 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	PM Peak Hour
Intersection:	Macarthur at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				633	273	659		1928	650	585	1084	312
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				167	72	173		507	171	154	285	82
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L		T	R		T	R	L		T	R
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0	
Adj Flow				666	287	694		2029	684	616	1141	328
%InSharedLn												
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0	0	0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	18.0	0.0			9.3	8.1	7.9	0.0
Yellow	4.0				3.2	4.3	4.3	
All Red	1.5				0.8	1.8	1.8	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				633	273	659		1928	650	585	1084	312
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				666	287	694		2029	684	616	1141	328
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
Lane group				L		T	R		T	R	L		T	R
Adj flow				666	287	694		2029	684	616	1141	328
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	666	3437	#	0.19	0.28	952	0.70
Prot								
Perm								
Thru	T	287	1863		0.15	0.28	516	0.56
Right	R	694	1583		0.44	1.00	1583	0.44
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2029	6765		0.30	0.34	2300	0.88
Right	R	684	1583	#	0.43	0.34	538	1.27
Southbound								
Prot								
Perm								
Left	L	616	3437	#	0.18	0.14	492	1.25
Prot								
Perm								
Thru	T	1141	6765		0.17	0.54	3684	0.31
Right	R	328	1583		0.21	0.54	862	0.38

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.81
Total lost time per cycle, L = 15.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.06

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.70	0.28	21.1	1.000	952	0.27	2.3	0.0	23.4	C		
T	0.56	0.28	20.1	1.000	516	0.15	1.3	0.0	21.4	C	13.3	B
R	0.44	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Northbound												
T	0.88	0.34	20.2	1.000	2300	0.41	4.4	0.0	24.6	C	58.2	E
R	1.27	0.34	21.4	1.000	538	0.50	136.2	0.0	157.6	F		
Southbound												
L	1.25	0.14	27.9	1.000	492	0.50	129.4	0.0	157.2	F		

T	0.31	0.54	8.1	1.000	3684	0.11	0.0	0.0	8.2	A	52.3	D
R	0.38	0.54	8.5	1.000	862	0.11	0.3	0.0	8.8	A		

Intersection delay = 44.8 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	65.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	65.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	23.5	21.1	0.00	0.0	0.0	23.4
T	0.0	0.00	23.5	20.1	0.00	0.0	0.0	21.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Northbound								
	0.0						0.0	
T	0.0	0.00	21.4	20.2	0.00	0.0	0.0	24.6
R	0.0	0.00	21.4	21.4	0.00	36.5	0.0	157.6
Southbound								
L	0.0	0.00	27.9	27.9	0.00	31.0	0.0	157.2
T	0.0	0.00	14.8	8.1	0.00	0.0	0.0	8.2
R	0.0	0.00	14.8	8.5	0.00	0.0	0.0	8.8

Intersection Delay 44.8 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound		
LaneGroup				L	T	R	T	R	L	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				342	287	694	558	684	317	314	328
So				1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	1	1	0 4	1	2	4	1
SL				1770	1863	1583	1862	1583	1770	1862	1583
LnCapacity				490	516	1583	633	538	253	1014	862
Flow Ratio				0.2	0.2	0.4	0.3	0.4	0.2	0.2	0.2
v/c Ratio				0.70	0.56	0.44	0.88	1.27	1.25	0.31	0.38
Grn Ratio				0.28	0.28	1.00	0.34	0.34	0.14	0.54	0.54
I Factor					1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1				5.5	4.4		9.5	12.4	5.7	3.1	3.4
kB				0.4	0.4	0.7	0.4	0.4	0.2	0.6	0.5
Q2				0.8	0.5	0.6	2.5	19.9	9.1	0.3	0.3
Q Average				6.4	4.9		12.0	32.3	14.8	3.4	3.7
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0	0
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2		1.2	1.1	1.2	1.2	1.2
BOQ				7.5	5.8		14.1	36.9	17.3	4.0	4.4
QSRatio											
85th Percentile Output:											
fB%				1.5	1.6		1.5	1.4	1.5	1.6	1.6
BOQ				9.8	7.6		18.0	45.3	22.0	5.3	5.8
QSRatio											
90th Percentile Output:											
fB%				1.7	1.7		1.6	1.5	1.6	1.7	1.7
BOQ				10.7	8.4		19.5	47.8	23.6	5.8	6.4
QSRatio											
95th Percentile Output:											
fB%				1.9	2.0		1.8	1.6	1.8	2.0	2.0
BOQ				12.2	9.6		21.7	51.6	26.1	6.7	7.4
QSRatio											
98th Percentile Output:											
fB%				2.3	2.4		2.1	1.8	2.0	2.5	2.5
BOQ				14.7	11.7		25.2	57.6	29.9	8.3	9.1
QSRatio											

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: SR-55 NB Ramps

Inter.: Baker at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
LGConfig	L	T			T	R		LTR				
Volume	527	945			169	116	307	332	288			
Lane Width	12.0	12.0			12.0	12.0		12.0				
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	34.8	5.5	5.1	0.0		35.9	0.0		
Yellow	3.2	4.0	4.0			3.5			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	616	1770	0.90	0.35	47.4	D		
T	1937	3547	0.51	0.55	14.6	B	26.3	C
Westbound								
T	553	3547	0.32	0.16	37.8	D	38.8	D
R	247	1583	0.49	0.16	40.1	D		
Northbound								
LTR	1194	3326	0.82	0.36	33.6	C	33.6	C
Southbound								

Intersection Delay = 30.2 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Baker at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: SR-55 NB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	527	945			169	116	307	332	288			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	139	249			44	31	81	87	76			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900		1900				
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
LGConfig	L	T			T	R		LTR				
Lane Width	12.0	12.0			12.0	12.0		12.0				
RTOR Vol						0			0			
Adj Flow	555	995			178	122		975				
%InSharedLn												
Prop LTs		0.000			0.000			0.331				
Prop RTs		0.000			0.000	1.000		0.311				
Peds Bikes					0			0			0	
Buses	0	0			0	0		0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0		0.0				
Arriv. Type	3	3			3	3		3				
Unit Ext.	3.0	3.0			3.0	3.0		3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0		2.0				
Ext of g	2.0	2.0			2.0	2.0		2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	34.8	5.5	5.1	0.0		35.9	0.0	
Yellow	3.2	4.0	4.0			3.5		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	527	945			169	116	307	332	288			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	555	995			178	122	323	349	303			
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
Lane group	L	T			T	R		LTR				
Adj flow	555	995			178	122		975				
Prop LTs		0.000			0.000			0.331				
Prop RTs		0.000			0.000	1.000		0.311				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound			Northbound			Southbound			
LG	L	T			T	R		LTR						
So	1900	1900			1900	1900		1900						
Lanes	1	2	0	0	2	1	0	2	0	0	0	0		
fW	1.000	1.000			1.000	1.000		1.000						
fHV	0.980	0.980			0.980	0.980		0.980						
fG	1.000	1.000			1.000	1.000		1.000						
fP	1.000	1.000			1.000	1.000		1.000						
fBB	1.000	1.000			1.000	1.000		1.000						
fA	1.000	1.000			1.000	1.000		1.000						
fLU	1.000	0.952			0.952	1.000		0.952						
fRT		1.000			1.000	0.850		0.953						
fLT	0.950	1.000			1.000			0.984						
Sec.														
fLpb	1.000	1.000			1.000			1.000						
fRpb		1.000			1.000	1.000		1.000						
S	1770	3547			3547	1583		3326						
Sec.														

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	555	1770	#	0.31	0.35	616	0.90
Prot								
Perm								
Thru	T	995	3547		0.28	0.55	1937	0.51
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	178	3547		0.05	0.16	553	0.32
Right	R	122	1583	#	0.08	0.16	247	0.49
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	975	3326	#	0.29	0.36	1194	0.82
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.68
Total lost time per cycle, L = 13.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.79

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.90	0.35	31.0	1.000	616	0.42	16.4	0.0	47.4	D		
T	0.51	0.55	14.3	1.000	1937	0.12	0.2	0.0	14.6	B	26.3	C
Westbound												
T	0.32	0.16	37.5	1.000	553	0.11	0.3	0.0	37.8	D	38.8	D
R	0.49	0.16	38.6	1.000	247	0.11	1.6	0.0	40.1	D		
Northbound												
LTR	0.82	0.36	29.1	1.000	1194	0.36	4.5	0.0	33.6	C	33.6	C
Southbound												

Intersection delay = 30.2 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.331	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 100.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

L	0.0	0.00	32.6	31.0	0.00	0.0	0.0	47.4
T	0.0	0.00	22.7	14.3	0.00	0.0	0.0	14.6
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	42.2	37.5	0.00	0.0	0.0	37.8
R	0.0	0.00	42.2	38.6	0.00	0.0	0.0	40.1
Northbound								
	0.0						0.0	
LTR	0.0	0.00	32.0	29.1	0.00	0.0	0.0	33.6
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 30.2 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	T		T	R		LTR					
Init Queue	0.0	0.0		0.0	0.0		0.0					
Flow Rate	555	522		93	122		512					
So	1900	1900		1900	1900		1900					
No.Lanes	1	2	0	0	2	1	0	2	0	0	0	0
SL	1770	1862		1862	1583		1746					
LnCapacity	616	1017		290	247		627					
Flow Ratio	0.3	0.3		0.0	0.1		0.3					
v/c Ratio	0.90	0.51		0.32	0.49		0.82					
Grn Ratio	0.35	0.55		0.16	0.16		0.36					
I Factor		1.000		1.000			1.000					
AT or PVG	3	3		3	3		3					
Pltn Ratio	1.00	1.00		1.00	1.00		1.00					
PF2	1.00	1.00		1.00	1.00		1.00					
Q1	14.6	9.1		2.3	3.1		12.9					
kB	0.5	0.7		0.4	0.3		0.6					
Q2	3.4	0.8		0.2	0.3		2.2					
Q Average	18.1	9.9		2.5	3.4		15.0					
Q Spacing	25.0	25.0		25.0	25.0		25.0					
Q Storage	0	0		0	0		0					
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2		1.2	1.2		1.2					
BOQ	21.0	11.7		2.9	4.1		17.6					
QSRatio												
85th Percentile Output:												
fB%	1.5	1.5		1.6	1.6		1.5					
BOQ	26.5	15.0		3.9	5.3		22.3					
QSRatio												
90th Percentile Output:												
fB%	1.6	1.6		1.8	1.7		1.6					
BOQ	28.2	16.3		4.3	5.9		23.9					
QSRatio												
95th Percentile Output:												
fB%	1.7	1.8		2.0	2.0		1.8					
BOQ	31.1	18.3		5.0	6.8		26.5					
QSRatio												
98th Percentile Output:												
fB%	1.9	2.2		2.5	2.5		2.0					
BOQ	35.2	21.5		6.2	8.4		30.3					
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: SR-55 NB Ramps

Inter.: Baker at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
LGConfig	L	T			T	R		LTR				
Volume	527	945			169	116	307	332	288			
Lane Width	12.0	12.0			12.0	12.0		12.0				
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	34.8	5.5	5.1	0.0		35.9	0.0		
Yellow	3.2	4.0	4.0			3.5			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	616	1770	0.90	0.35	47.4	D		
T	1937	3547	0.51	0.55	14.6	B	26.3	C
Westbound								
T	553	3547	0.32	0.16	37.8	D	38.8	D
R	247	1583	0.49	0.16	40.1	D		
Northbound								
LTR	1194	3326	0.82	0.36	33.6	C	33.6	C
Southbound								

Intersection Delay = 30.2 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Baker at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: SR-55 NB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	527	945			169	116	307	332	288			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	139	249			44	31	81	87	76			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900		1900				
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
LGConfig	L	T			T	R		LTR				
Lane Width	12.0	12.0			12.0	12.0		12.0				
RTOR Vol						0			0			
Adj Flow	555	995			178	122		975				
%InSharedLn												
Prop LTs		0.000			0.000			0.331				
Prop RTs		0.000			0.000	1.000		0.311				
Peds Bikes					0			0			0	
Buses	0	0			0	0		0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0		0.0				
Arriv. Type	3	3			3	3		3				
Unit Ext.	3.0	3.0			3.0	3.0		3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0		2.0				
Ext of g	2.0	2.0			2.0	2.0		2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	34.8	5.5	5.1	0.0		35.9	0.0	
Yellow	3.2	4.0	4.0			3.5		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	527	945			169	116	307	332	288			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	555	995			178	122	323	349	303			
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
Lane group	L	T			T	R		LTR				
Adj flow	555	995			178	122		975				
Prop LTs		0.000			0.000			0.331				
Prop RTs		0.000			0.000	1.000		0.311				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound			Northbound			Southbound			
LG	L	T			T	R		LTR						
So	1900	1900			1900	1900		1900						
Lanes	1	2	0	0	2	1	0	2	0	0	0	0		
fW	1.000	1.000			1.000	1.000		1.000						
fHV	0.980	0.980			0.980	0.980		0.980						
fG	1.000	1.000			1.000	1.000		1.000						
fP	1.000	1.000			1.000	1.000		1.000						
fBB	1.000	1.000			1.000	1.000		1.000						
fA	1.000	1.000			1.000	1.000		1.000						
fLU	1.000	0.952			0.952	1.000		0.952						
fRT		1.000			1.000	0.850		0.953						
fLT	0.950	1.000			1.000			0.984						
Sec.														
fLpb	1.000	1.000			1.000			1.000						
fRpb		1.000			1.000	1.000		1.000						
S	1770	3547			3547	1583		3326						
Sec.														

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	555	1770	#	0.31	0.35	616	0.90
Prot								
Perm								
Thru	T	995	3547		0.28	0.55	1937	0.51
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	178	3547		0.05	0.16	553	0.32
Right	R	122	1583	#	0.08	0.16	247	0.49
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	975	3326	#	0.29	0.36	1194	0.82
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.68
Total lost time per cycle, L = 13.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.79

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.90	0.35	31.0	1.000	616	0.42	16.4	0.0	47.4	D		
T	0.51	0.55	14.3	1.000	1937	0.12	0.2	0.0	14.6	B	26.3	C
Westbound												
T	0.32	0.16	37.5	1.000	553	0.11	0.3	0.0	37.8	D	38.8	D
R	0.49	0.16	38.6	1.000	247	0.11	1.6	0.0	40.1	D		
Northbound												
LTR	0.82	0.36	29.1	1.000	1194	0.36	4.5	0.0	33.6	C	33.6	C
Southbound												

Intersection delay = 30.2 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.331	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 100.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

L	0.0	0.00	32.6	31.0	0.00	0.0	0.0	47.4
T	0.0	0.00	22.7	14.3	0.00	0.0	0.0	14.6
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	42.2	37.5	0.00	0.0	0.0	37.8
R	0.0	0.00	42.2	38.6	0.00	0.0	0.0	40.1
Northbound								
	0.0						0.0	
LTR	0.0	0.00	32.0	29.1	0.00	0.0	0.0	33.6
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 30.2 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	T		T	R		LTR					
Init Queue	0.0	0.0		0.0	0.0		0.0					
Flow Rate	555	522		93	122		512					
So	1900	1900		1900	1900		1900					
No.Lanes	1	2	0	0	2	1	0	2	0	0	0	0
SL	1770	1862		1862	1583		1746					
LnCapacity	616	1017		290	247		627					
Flow Ratio	0.3	0.3		0.0	0.1		0.3					
v/c Ratio	0.90	0.51		0.32	0.49		0.82					
Grn Ratio	0.35	0.55		0.16	0.16		0.36					
I Factor		1.000		1.000			1.000					
AT or PVG	3	3		3	3		3					
Pltn Ratio	1.00	1.00		1.00	1.00		1.00					
PF2	1.00	1.00		1.00	1.00		1.00					
Q1	14.6	9.1		2.3	3.1		12.9					
kB	0.5	0.7		0.4	0.3		0.6					
Q2	3.4	0.8		0.2	0.3		2.2					
Q Average	18.1	9.9		2.5	3.4		15.0					
Q Spacing	25.0	25.0		25.0	25.0		25.0					
Q Storage	0	0		0	0		0					
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2		1.2	1.2		1.2					
BOQ	21.0	11.7		2.9	4.1		17.6					
QSRatio												
85th Percentile Output:												
fB%	1.5	1.5		1.6	1.6		1.5					
BOQ	26.5	15.0		3.9	5.3		22.3					
QSRatio												
90th Percentile Output:												
fB%	1.6	1.6		1.8	1.7		1.6					
BOQ	28.2	16.3		4.3	5.9		23.9					
QSRatio												
95th Percentile Output:												
fB%	1.7	1.8		2.0	2.0		1.8					
BOQ	31.1	18.3		5.0	6.8		26.5					
QSRatio												
98th Percentile Output:												
fB%	1.9	2.2		2.5	2.5		2.0					
BOQ	35.2	21.5		6.2	8.4		30.3					
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: SR-55 SB Ramps

Inter.: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
LGConfig		T	R	L	T						LTR	
Volume		1100	242	49	356					412	121	252
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
WB Left	A				SB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	6.0	8.9	12.3	0.0		19.5	0.0		
Yellow	3.0	4.0	4.0			3.3			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1430	3547	0.81	0.40	20.8	C	19.6	B
R	638	1583	0.40	0.40	14.2	B		
Westbound								
L	163	1770	0.32	0.09	28.7	C		
T	1975	3547	0.19	0.56	7.2	A	9.8	A
Northbound								
Southbound								
LTR	987	3290	0.84	0.30	27.7	C	27.7	C

Intersection Delay = 20.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Baker at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: SR-55 SB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1100	242	49	356					412	121	252
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		289	64	13	94					108	32	66
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900	1900	1900						1900	
ParkExist												
NumPark												
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
LGConfig		T	R	L	T						LTR	
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0
Adj Flow		1158	255	52	375						826	
%InSharedLn												
Prop LTs		0.000			0.000						0.525	
Prop RTs		0.000	1.000		0.000						0.321	
Peds Bikes		0						0			0	
Buses		0	0	0	0						0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0	0.0	0.0						0.0	
Arriv. Type		3	3	3	3						3	
Unit Ext.		3.0	3.0	3.0	3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0	2.0	2.0						2.0	
Ext of g		2.0	2.0	2.0	2.0						2.0	
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
WB Left	A				SB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	6.0	8.9	12.3	0.0		19.5	0.0		
Yellow	3.0	4.0	4.0			3.3			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1100	242	49	356					412	121	252
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		1158	255	52	375					434	127	265
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
Lane group		T	R	L	T						LTR	
Adj flow		1158	255	52	375						826	
Prop LTs		0.000			0.000						0.525	
Prop RTs		0.000	1.000		0.000						0.321	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound					Southbound	
LG	T	R	L	T						LTR	
So	1900	1900	1900	1900						1900	
Lanes	0 2	1	1	2	0	0	0	0	0	2	0
fW	1.000	1.000	1.000	1.000						1.000	
fHV	0.980	0.980	0.980	0.980						0.980	
fG	1.000	1.000	1.000	1.000						1.000	
fP	1.000	1.000	1.000	1.000						1.000	
fBB	1.000	1.000	1.000	1.000						1.000	
fA	1.000	1.000	1.000	1.000						1.000	
fLU	0.952	1.000	1.000	0.952						0.952	
fRT	1.000	0.850		1.000						0.952	
fLT	1.000		0.950	1.000						0.974	
Sec.											
fLpb	1.000		1.000	1.000						1.000	
fRpb	1.000	1.000		1.000						1.000	
S	3547	1583	1770	3547						3290	
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1158	3547	#	0.33	0.40	1430	0.81
Right	R	255	1583		0.16	0.40	638	0.40
Westbound								
Prot								
Perm								
Left	L	52	1770	#	0.03	0.09	163	0.32
Prot								
Perm								
Thru	T	375	3547		0.11	0.56	1975	0.19
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	826	3290	#	0.25	0.30	987	0.84
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.61
Total lost time per cycle, L = 13.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.76

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.81	0.40	17.2	1.000	1430	0.35	3.6	0.0	20.8	C	19.6	B
R	0.40	0.40	13.8	1.000	638	0.11	0.4	0.0	14.2	B		
Westbound												
L	0.32	0.09	27.6	1.000	163	0.11	1.1	0.0	28.7	C		
T	0.19	0.56	7.1	1.000	1975	0.11	0.0	0.0	7.2	A	9.8	A
Northbound												
Southbound												

LTR	0.84	0.30	21.3	1.000	987	0.37	6.4	0.0	27.7	C	27.7	C

Intersection delay = 20.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.525
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	19.4	17.2	0.00	0.0	0.0	20.8
R	0.0	0.00	19.4	13.8	0.00	0.0	0.0	14.2
Westbound								
L	0.0	0.00	29.5	27.6	0.00	0.0	0.0	28.7
T	0.0	0.00	14.4	7.1	0.00	0.0	0.0	7.2
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LTR	0.0	0.00	22.8	21.3	0.00	0.0	0.0	27.7
	0.0						0.0	

Intersection Delay 20.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound			Southbound		
LaneGroup	T	R	L	T					LTR		
Init Queue	0.0	0.0	0.0	0.0					0.0		
Flow Rate	608	255	52	196					433		
So	1900	1900	1900	1900					1900		
No.Lanes	0 2	1	1	2	0	0	0	0	2	0	
SL	1862	1583	1770	1862					1727		
LnCapacity	751	638	163	1037					518		
Flow Ratio	0.3	0.2	0.0	0.1					0.3		
v/c Ratio	0.81	0.40	0.32	0.19					0.84		
Grn Ratio	0.40	0.40	0.09	0.56					0.30		
I Factor	1.000			1.000					1.000		
AT or PVG	3	3	3	3					3		
Pltn Ratio	1.00	1.00	1.00	1.00					1.00		
PF2	1.00	1.00	1.00	1.00					1.00		
Q1	9.7	3.3	0.9	1.8					7.3		
kB	0.5	0.4	0.2	0.6					0.4		
Q2	1.8	0.3	0.1	0.1					1.7		
Q Average	11.6	3.6	1.0	1.9					9.0		
Q Spacing	25.0	25.0	25.0	25.0					25.0		
Q Storage	0	0	0	0					0		
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2	1.2	1.2					1.2		
BOQ	13.6	4.2	1.2	2.3					10.6		
QSRatio											
85th Percentile Output:											
fB%	1.5	1.6	1.6	1.6					1.5		
BOQ	17.4	5.6	1.5	3.0					13.7		
QSRatio											
90th Percentile Output:											
fB%	1.6	1.7	1.8	1.8					1.7		
BOQ	18.8	6.2	1.7	3.3					14.9		
QSRatio											
95th Percentile Output:											
fB%	1.8	2.0	2.1	2.0					1.9		
BOQ	21.0	7.1	2.0	3.9					16.8		
QSRatio											
98th Percentile Output:											
fB%	2.1	2.5	2.6	2.6					2.2		
BOQ	24.4	8.8	2.5	4.8					19.8		
QSRatio											

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: SR-55 SB Ramps

Inter.: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
LGConfig		T	R	L	T						LTR	
Volume		488	392	209	933					173	284	434
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
WB Left	A				SB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	11.5	13.9	5.5	0.0		25.8	0.0		
Yellow	3.0	4.0	4.0			3.3			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 75.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1154	3547	0.45	0.33	20.2	C	25.5	C
R	515	1583	0.80	0.33	32.0	C		
Westbound								
L	271	1770	0.81	0.15	47.6	D		
T	1887	3547	0.52	0.53	11.6	B	18.2	B
Northbound								
Southbound								
LTR	1120	3256	0.84	0.34	28.4	C	28.4	C

Intersection Delay = 23.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	PM Peak Hour
Intersection:	Baker at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: SR-55 SB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		488	392	209	933					173	284	434
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		128	103	55	246					46	75	114
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900	1900	1900						1900	
ParkExist												
NumPark												
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
LGConfig		T	R	L	T						LTR	
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0
Adj Flow		514	413	220	982						938	
%InSharedLn												
Prop LTs		0.000			0.000						0.194	
Prop RTs		0.000	1.000		0.000						0.487	
Peds Bikes		0						0			0	
Buses		0	0	0	0						0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0	0.0	0.0						0.0	
Arriv. Type		3	3	3	3						3	
Unit Ext.		3.0	3.0	3.0	3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0	2.0	2.0						2.0	
Ext of g		2.0	2.0	2.0	2.0						2.0	
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	11.5	13.9	5.5	0.0		25.8	0.0	
Yellow	3.0	4.0	4.0			3.3		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 75.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		488	392	209	933					173	284	434
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		514	413	220	982					182	299	457
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
Lane group		T	R	L	T						LTR	
Adj flow		514	413	220	982						938	
Prop LTs		0.000			0.000						0.194	
Prop RTs		0.000	1.000		0.000						0.487	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound				Southbound	
LG	T	R	L	T					LTR	
So	1900	1900	1900	1900					1900	
Lanes	0 2	1	1	2	0	0	0	0	2	0
fW	1.000	1.000	1.000	1.000					1.000	
fHV	0.980	0.980	0.980	0.980					0.980	
fG	1.000	1.000	1.000	1.000					1.000	
fP	1.000	1.000	1.000	1.000					1.000	
fBB	1.000	1.000	1.000	1.000					1.000	
fA	1.000	1.000	1.000	1.000					1.000	
fLU	0.952	1.000	1.000	0.952					0.952	
fRT	1.000	0.850		1.000					0.927	
fLT	1.000		0.950	1.000					0.990	
Sec.										
fLpb	1.000		1.000	1.000					1.000	
fRpb	1.000	1.000		1.000					1.000	
S	3547	1583	1770	3547					3256	
Sec.										

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	514	3547		0.14	0.33	1154	0.45
Right	R	413	1583	#	0.26	0.33	515	0.80
Westbound								
Prot								
Perm								
Left	L	220	1770	#	0.12	0.15	271	0.81
Prot								
Perm								
Thru	T	982	3547		0.28	0.53	1887	0.52
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	938	3256	#	0.29	0.34	1120	0.84
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.67
Total lost time per cycle, L = 13.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.82

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.45	0.33	20.0	1.000	1154	0.11	0.3	0.0	20.2	C	25.5	C
R	0.80	0.33	23.1	1.000	515	0.35	8.9	0.0	32.0	C		
Westbound												
L	0.81	0.15	30.7	1.000	271	0.35	16.9	0.0	47.6	D		
T	0.52	0.53	11.4	1.000	1887	0.13	0.3	0.0	11.6	B	18.2	B
Northbound												
Southbound												

LTR 0.84 0.34 22.7 1.000 1120 0.37 5.7 0.0 28.4 C 28.4 C

Intersection delay = 23.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.194
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	75.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	25.3	20.0	0.00	0.0	0.0	20.2
R	0.0	0.00	25.3	23.1	0.00	0.0	0.0	32.0
Westbound								
L	0.0	0.00	31.8	30.7	0.00	0.0	0.0	47.6
T	0.0	0.00	17.5	11.4	0.00	0.0	0.0	11.6
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LTR	0.0	0.00	24.6	22.7	0.00	0.0	0.0	28.4
	0.0						0.0	

Intersection Delay 23.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound			Southbound		
LaneGroup	T	R	L	T					LTR		
Init Queue	0.0	0.0	0.0	0.0					0.0		
Flow Rate	269	413	220	515					492		
So	1900	1900	1900	1900					1900		
No.Lanes	0 2	1	1	2	0	0	0	0	2	0	
SL	1862	1583	1770	1862					1710		
LnCapacity	606	515	271	991					588		
Flow Ratio	0.1	0.3	0.1	0.3					0.3		
v/c Ratio	0.44	0.80	0.81	0.52					0.84		
Grn Ratio	0.33	0.33	0.15	0.53					0.34		
I Factor	1.000			1.000					1.000		
AT or PVG	3	3	3	3					3		
Pltn Ratio	1.00	1.00	1.00	1.00					1.00		
PF2	1.00	1.00	1.00	1.00					1.00		
Q1	4.4	7.9	4.4	6.9					9.4		
kB	0.5	0.4	0.3	0.6					0.4		
Q2	0.4	1.5	1.0	0.7					2.0		
Q Average	4.8	9.4	5.5	7.6					11.4		
Q Spacing	25.0	25.0	25.0	25.0					25.0		
Q Storage	0	0	0	0					0		
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2	1.2	1.2					1.2		
BOQ	5.7	11.0	6.5	9.0					13.4		
QSRatio											
85th Percentile Output:											
fB%	1.6	1.5	1.5	1.5					1.5		
BOQ	7.4	14.2	8.5	11.6					17.2		
QSRatio											
90th Percentile Output:											
fB%	1.7	1.7	1.7	1.7					1.6		
BOQ	8.2	15.4	9.3	12.7					18.6		
QSRatio											
95th Percentile Output:											
fB%	2.0	1.9	1.9	1.9					1.8		
BOQ	9.4	17.4	10.6	14.4					20.8		
QSRatio											
98th Percentile Output:											
fB%	2.4	2.2	2.4	2.3					2.1		
BOQ	11.4	20.5	12.9	17.2					24.2		
QSRatio											

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: SR-55 NB Ramps

Inter.: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	0	2	0	0	0	0
LGConfig	L	T			TR			LTR				
Volume	302	859			126	199	75	646	113			
Lane Width	12.0	12.0			12.0			12.0				
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	21.1	6.2	5.0	0.0		28.5	0.0		
Yellow	3.6	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	467	1770	0.68	0.26	30.4	C		
T	1858	3547	0.49	0.52	12.4	B	17.1	B
Westbound								
TR	652	3222	0.52	0.20	29.2	C	29.2	C
Northbound								
LTR	1232	3459	0.71	0.36	24.2	C	24.2	C
Southbound								

Intersection Delay = 21.3 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Paularino at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: SR-55 NB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	302	859			126	199	75	646	113			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	79	226			33	52	20	170	30			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900			1900				
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	0	0	2	0	0	0	0
LGConfig	L	T			TR			LTR				
Lane Width	12.0	12.0			12.0			12.0				
RTOR Vol					0			0				
Adj Flow	318	904			342			878				
%InSharedLn												
Prop LTs		0.000			0.000			0.090				
Prop RTs		0.000			0.611			0.136				
Peds Bikes					0			0			0	
Buses	0	0			0			0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0			0.0				
Arriv. Type	3	3			3			3				
Unit Ext.	3.0	3.0			3.0			3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0			2.0				
Ext of g	2.0	2.0			2.0			2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.1	6.2	5.0	0.0		28.5	0.0	
Yellow	3.6	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	302	859			126	199	75	646	113			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	318	904			133	209	79	680	119			
No. Lanes	1	2	0	0	2	0	0	2	0	0	0	0
Lane group	L	T			TR			LTR				
Adj flow	318	904			342			878				
Prop LTs		0.000			0.000			0.090				
Prop RTs		0.000			0.611			0.136				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound				Northbound				Southbound			
LG	L	T			TR				LTR							
So	1900	1900			1900				1900							
Lanes	1	2	0	0	2	0	0		2	0	0	0	0			
fW	1.000	1.000			1.000				1.000							
fHV	0.980	0.980			0.980				0.980							
fG	1.000	1.000			1.000				1.000							
fP	1.000	1.000			1.000				1.000							
fBB	1.000	1.000			1.000				1.000							
fA	1.000	1.000			1.000				1.000							
fLU	1.000	0.952			0.952				0.952							
fRT		1.000			0.908				0.980							
fLT	0.950	1.000			1.000				0.996							
Sec.																
fLpb	1.000	1.000			1.000				1.000							
fRpb		1.000			1.000				1.000							
S	1770	3547			3222				3459							
Sec.																

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	318	1770	#	0.18	0.26	467	0.68
Prot								
Perm								
Thru	T	904	3547		0.25	0.52	1858	0.49
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	342	3222	#	0.11	0.20	652	0.52
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	878	3459	#	0.25	0.36	1232	0.71
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.54
Total lost time per cycle, L = 14.20 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.66

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.68	0.26	26.4	1.000	467	0.25	4.0	0.0	30.4	C		
T	0.49	0.52	12.2	1.000	1858	0.11	0.2	0.0	12.4	B	17.1	B
Westbound												
TR	0.52	0.20	28.5	1.000	652	0.13	0.8	0.0	29.2	C	29.2	C
Northbound												
LTR	0.71	0.36	22.2	1.000	1232	0.28	2.0	0.0	24.2	C	24.2	C
Southbound												

Intersection delay = 21.3 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.090	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	29.4	26.4	0.00	0.0	0.0	30.4

T	0.0	0.00	19.0	12.2	0.00	0.0	0.0	12.4
	0.0						0.0	
Westbound								
	0.0						0.0	
TR	0.0	0.00	31.9	28.5	0.00	0.0	0.0	29.2
	0.0						0.0	
Northbound								
	0.0						0.0	
LTR	0.0	0.00	25.8	22.2	0.00	0.0	0.0	24.2
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 21.3 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	T		TR			LTR					
Init Queue	0.0	0.0		0.0			0.0					
Flow Rate	318	474		179			461					
So	1900	1900		1900			1900					
No.Lanes	1	2	0	0	2	0	0	2	0	0	0	0
SL	1770	1862		1692			1816					
LnCapacity	467	975		342			647					
Flow Ratio	0.2	0.3		0.1			0.3					
v/c Ratio	0.68	0.49		0.52			0.71					
Grn Ratio	0.26	0.52		0.20			0.36					
I Factor		1.000		1.000			1.000					
AT or PVG	3	3		3			3					
Pltn Ratio	1.00	1.00		1.00			1.00					
PF2	1.00	1.00		1.00			1.00					
Q1	6.3	6.7		3.5			8.8					
kB	0.4	0.6		0.3			0.5					
Q2	0.8	0.6		0.4			1.2					
Q Average	7.2	7.3		3.9			10.0					
Q Spacing	25.0	25.0		25.0			25.0					
Q Storage	0	0		0			0					
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2		1.2			1.2					
BOQ	8.5	8.7		4.7			11.8					
QSRatio												
85th Percentile Output:												
fB%	1.5	1.5		1.6			1.5					
BOQ	11.0	11.2		6.1			15.2					
QSRatio												
90th Percentile Output:												
fB%	1.7	1.7		1.7			1.6					
BOQ	12.0	12.3		6.8			16.4					
QSRatio												
95th Percentile Output:												
fB%	1.9	1.9		2.0			1.8					
BOQ	13.6	13.9		7.8			18.5					
QSRatio												
98th Percentile Output:												
fB%	2.3	2.3		2.4			2.2					
BOQ	16.3	16.6		9.5			21.6					
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: SR-55 NB Ramps

Inter.: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	0	2	0	0	0	0
LGConfig	L	T			TR			LTR				
Volume	256	294			613	375	125	656	52			
Lane Width	12.0	12.0			12.0			12.0				
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	12.8	6.1	15.2	0.0		21.7	0.0		
Yellow	3.6	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 75.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	302	1770	0.89	0.17	56.7	E		
T	2067	3547	0.15	0.58	7.2	A	30.2	C
Westbound								
TR	1173	3345	0.89	0.35	31.4	C	31.4	C
Northbound								
LTR	1009	3487	0.87	0.29	33.7	C	33.7	C
Southbound								

Intersection Delay = 31.9 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Paularino at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: SR-55 NB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	256	294			613	375	125	656	52			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	67	77			161	99	33	173	14			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900			1900				
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	0	0	2	0	0	0	0
LGConfig	L	T			TR			LTR				
Lane Width	12.0	12.0			12.0			12.0				
RTOR Vol						0			0			
Adj Flow	269	309			1040			878				
%InSharedLn												
Prop LTs		0.000			0.000			0.150				
Prop RTs		0.000			0.380			0.063				
Peds Bikes					0			0			0	
Buses	0	0			0			0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0			0.0				
Arriv. Type	3	3			3			3				
Unit Ext.	3.0	3.0			3.0			3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0			2.0				
Ext of g	2.0	2.0			2.0			2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	12.8	6.1	15.2	0.0		21.7	0.0	
Yellow	3.6	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 75.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	256	294			613	375	125	656	52			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	269	309			645	395	132	691	55			
No. Lanes	1	2	0	0	2	0	0	2	0	0	0	0
Lane group	L	T			TR			LTR				
Adj flow	269	309			1040			878				
Prop LTs		0.000			0.000			0.150				
Prop RTs		0.000			0.380			0.063				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound				Northbound				Southbound			
LG	L	T			TR				LTR							
So	1900	1900			1900				1900							
Lanes	1	2	0	0	2	0	0		2	0	0	0	0			
fW	1.000	1.000			1.000				1.000							
fHV	0.980	0.980			0.980				0.980							
fG	1.000	1.000			1.000				1.000							
fP	1.000	1.000			1.000				1.000							
fBB	1.000	1.000			1.000				1.000							
fA	1.000	1.000			1.000				1.000							
fLU	1.000	0.952			0.952				0.952							
fRT		1.000			0.943				0.991							
fLT	0.950	1.000			1.000				0.993							
Sec.																
fLpb	1.000	1.000			1.000				1.000							
fRpb		1.000			1.000				1.000							
S	1770	3547			3345				3487							
Sec.																

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	269	1770	#	0.15	0.17	302	0.89
Prot								
Perm								
Thru	T	309	3547		0.09	0.58	2067	0.15
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1040	3345	#	0.31	0.35	1173	0.89
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	878	3487	#	0.25	0.29	1009	0.87
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.71
Total lost time per cycle, L = 14.20 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.88

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.89	0.17	30.4	1.000	302	0.41	26.3	0.0	56.7	E		
T	0.15	0.58	7.2	1.000	2067	0.11	0.0	0.0	7.2	A	30.2	C
Westbound												
TR	0.89	0.35	22.9	1.000	1173	0.41	8.5	0.0	31.4	C	31.4	C
Northbound												
LTR	0.87	0.29	25.3	1.000	1009	0.40	8.3	0.0	33.7	C	33.7	C
Southbound												

Intersection delay = 31.9 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.150	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	75.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	31.1	30.4	0.00	0.0	0.0	56.7

T	0.0	0.00	15.6	7.2	0.00	0.0	0.0	7.2
	0.0						0.0	
Westbound								
	0.0						0.0	
TR	0.0	0.00	24.4	22.9	0.00	0.0	0.0	31.4
	0.0						0.0	
Northbound								
	0.0						0.0	
LTR	0.0	0.00	26.6	25.3	0.00	0.0	0.0	33.7
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 31.9 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	T		TR			LTR					
Init Queue	0.0	0.0		0.0			0.0					
Flow Rate	269	162		546			461					
So	1900	1900		1900			1900					
No.Lanes	1	2	0	0	2	0	0	2	0	0	0	0
SL	1770	1862		1756			1831					
LnCapacity	302	1085		616			529					
Flow Ratio	0.2	0.1		0.3			0.3					
v/c Ratio	0.89	0.15		0.89			0.87					
Grn Ratio	0.17	0.58		0.35			0.29					
I Factor		1.000		1.000			1.000					
AT or PVG	3	3		3			3					
Pltn Ratio	1.00	1.00		1.00			1.00					
PF2	1.00	1.00		1.00			1.00					
Q1	5.5	1.5		10.7			9.1					
kB	0.3	0.6		0.5			0.4					
Q2	1.7	0.1		2.7			2.3					
Q Average	7.2	1.7		13.5			11.4					
Q Spacing	25.0	25.0		25.0			25.0					
Q Storage	0	0		0			0					
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2		1.2			1.2					
BOQ	8.5	2.0		15.8			13.4					
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6		1.5			1.5					
BOQ	11.1	2.6		20.1			17.1					
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8		1.6			1.6					
BOQ	12.1	2.9		21.6			18.5					
QSRatio												
95th Percentile Output:												
fB%	1.9	2.0		1.8			1.8					
BOQ	13.7	3.4		24.0			20.7					
QSRatio												
98th Percentile Output:												
fB%	2.3	2.6		2.1			2.1					
BOQ	16.4	4.3		27.7			24.1					
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: SR-55 SB Ramps

Inter.: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
LGConfig		TR		L	T						LTR	
Volume		721	134	48	149					442	658	210
Lane Width		12.0		12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	5.0	5.0	19.0	0.0	47.2	0.0		
Yellow	3.2	4.0	4.0		3.6			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	1057	3463	0.85	0.31	37.8	D	37.8	D
Westbound								
L	93	1770	0.55	0.05	50.6	D		
T	1426	3547	0.11	0.40	17.8	B	25.8	C
Northbound								
Southbound								
LTR	1691	3404	0.82	0.50	23.4	C	23.4	C

Intersection Delay = 28.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Paularino at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: SR-55 SB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		721	134	48	149					442	658	210
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		190	35	13	39					116	173	55
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900		1900	1900						1900	
ParkExist												
NumPark												
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
LGConfig		TR		L	T						LTR	
Lane Width		12.0		12.0	12.0						12.0	
RTOR Vol			0									0
Adj Flow		900		51	157						1379	
%InSharedLn												
Prop LTs		0.000			0.000						0.337	
Prop RTs		0.157			0.000						0.160	
Peds Bikes		0						0			0	
Buses		0		0	0						0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0						0.0	
Arriv. Type		3		3	3						3	
Unit Ext.		3.0		3.0	3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0		2.0	2.0						2.0	
Ext of g		2.0		2.0	2.0						2.0	
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left		A			SB Left	A		
Thru		A	A	A	Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		5.0	5.0	19.0	0.0	47.2	0.0	
Yellow		3.2	4.0	4.0		3.6		
All Red		1.0	1.0	1.0		1.0		

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		721	134	48	149					442	658	210
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		759	141	51	157					465	693	221
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
Lane group		TR		L	T						LTR	
Adj flow		900		51	157						1379	
Prop LTs		0.000			0.000						0.337	
Prop RTs		0.157			0.000						0.160	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound				Southbound	
LG	TR		L	T					LTR	
So	1900		1900	1900					1900	
Lanes	0 2	0	1	2	0 0	0	0	0	2	0
fW	1.000		1.000	1.000					1.000	
fHV	0.980		0.980	0.980					0.980	
fG	1.000		1.000	1.000					1.000	
fP	1.000		1.000	1.000					1.000	
fBB	1.000		1.000	1.000					1.000	
fA	1.000		1.000	1.000					1.000	
fLU	0.952		1.000	0.952					0.952	
fRT	0.976			1.000					0.976	
fLT	1.000		0.950	1.000					0.983	
Sec.										
fLpb	1.000		1.000	1.000					1.000	
fRpb	1.000			1.000					1.000	
S	3463		1770	3547					3404	
Sec.										

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	900	3463	#	0.26	0.31	1057	0.85
Right								
Westbound								
Prot								
Perm								
Left	L	51	1770	#	0.03	0.05	93	0.55
Prot								
Perm								
Thru	T	157	3547		0.04	0.40	1426	0.11
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	1379	3404	#	0.41	0.50	1691	0.82
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.69
Total lost time per cycle, L = 13.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.81

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	0.85	0.31	31.0	1.000	1057	0.38	6.8	0.0	37.8	D	37.8	D
Westbound												
L	0.55	0.05	43.9	1.000	93	0.15	6.7	0.0	50.6	D		
T	0.11	0.40	17.8	1.000	1426	0.11	0.0	0.0	17.8	B	25.8	C
Northbound												
Southbound												

LTR 0.82 0.50 20.2 1.000 1691 0.36 3.2 0.0 23.4 C 23.4 C

Intersection delay = 28.8 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.337
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	33.0	31.0	0.00	0.0	0.0	37.8
	0.0						0.0	
Westbound								
L	0.0	0.00	45.0	43.9	0.00	0.0	0.0	50.6
T	0.0	0.00	28.4	17.8	0.00	0.0	0.0	17.8
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LTR	0.0	0.00	23.9	20.2	0.00	0.0	0.0	23.4
	0.0						0.0	

Intersection Delay 28.8 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup	TR	L T		LTR
Init Queue	0.0	0.0 0.0		0.0
Flow Rate	472	51 82		724
So	1900	1900 1900		1900
No.Lanes	0 2 0	1 2 0	0 0 0	0 2 0
SL	1818	1770 1862		1787
LnCapacity	555	93 748		888
Flow Ratio	0.3	0.0 0.0		0.4
v/c Ratio	0.85	0.55 0.11		0.82
Grn Ratio	0.31	0.05 0.40		0.50
I Factor	1.000	1.000		1.000
AT or PVG	3	3 3		3
Pltn Ratio	1.00	1.00 1.00		1.00
PF2	1.00	1.00 1.00		1.00
Q1	11.7	1.3 1.4		16.2
kB	0.5	0.2 0.6		0.7
Q2	2.3	0.2 0.1		2.6
Q Average	14.0	1.5 1.4		18.8
Q Spacing	25.0	25.0 25.0		25.0
Q Storage	0	0 0		0
Q S Ratio				
70th Percentile Output:				
fB%	1.2	1.2 1.2		1.2
BOQ	16.4	1.8 1.7		21.8
QSRatio				
85th Percentile Output:				
fB%	1.5	1.6 1.6		1.5
BOQ	20.9	2.4 2.3		27.4
QSRatio				
90th Percentile Output:				
fB%	1.6	1.8 1.8		1.6
BOQ	22.4	2.7 2.5		29.2
QSRatio				
95th Percentile Output:				
fB%	1.8	2.1 2.1		1.7
BOQ	24.9	3.1 2.9		32.1
QSRatio				
98th Percentile Output:				
fB%	2.0	2.6 2.6		1.9
BOQ	28.6	3.9 3.7		36.3
QSRatio				

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: SR-55 SB Ramps

Inter.: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
LGConfig		TR		L	T						LTR	
Volume		422	129	165	578					90	555	286
Lane Width		12.0		12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	8.5	5.3	7.8	0.0	24.6	0.0		
Yellow	3.2	4.0	4.0		3.6			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	953	3422	0.61	0.28	21.5	C	21.5	C
Westbound								
L	231	1770	0.75	0.13	40.3	D		
T	1681	3547	0.36	0.47	11.0	B	17.5	B
Northbound								
Southbound								
LTR	1274	3367	0.77	0.38	20.6	C	20.6	C

Intersection Delay = 19.8 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	PM Peak Hour
Intersection:	Paularino at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: SR-55 SB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		422	129	165	578					90	555	286
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		111	34	43	152					24	146	75
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900		1900	1900						1900	
ParkExist												
NumPark												
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
LGConfig		TR		L	T						LTR	
Lane Width		12.0		12.0	12.0						12.0	
RTOR Vol			0									0
Adj Flow		580		174	608						980	
%InSharedLn												
Prop LTs		0.000			0.000						0.097	
Prop RTs		0.234			0.000						0.307	
Peds Bikes		0						0			0	
Buses		0		0	0						0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0						0.0	
Arriv. Type		3		3	3						3	
Unit Ext.		3.0		3.0	3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0		2.0	2.0						2.0	
Ext of g		2.0		2.0	2.0						2.0	
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left		A			SB Left	A		
Thru		A	A	A	Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		8.5	5.3	7.8	0.0	24.6	0.0	
Yellow		3.2	4.0	4.0		3.6		
All Red		1.0	1.0	1.0		1.0		

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		422	129	165	578					90	555	286
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		444	136	174	608					95	584	301
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
Lane group		TR		L	T						LTR	
Adj flow		580		174	608						980	
Prop LTs		0.000			0.000						0.097	
Prop RTs		0.234			0.000						0.307	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound				Southbound	
LG	TR		L	T					LTR	
So	1900		1900	1900					1900	
Lanes	0 2	0	1	2	0 0	0	0	0	2	0
fW	1.000		1.000	1.000					1.000	
fHV	0.980		0.980	0.980					0.980	
fG	1.000		1.000	1.000					1.000	
fP	1.000		1.000	1.000					1.000	
fBB	1.000		1.000	1.000					1.000	
fA	1.000		1.000	1.000					1.000	
fLU	0.952		1.000	0.952					0.952	
fRT	0.965			1.000					0.954	
fLT	1.000		0.950	1.000					0.995	
Sec.										
fLpb	1.000		1.000	1.000					1.000	
fRpb	1.000			1.000					1.000	
S	3422		1770	3547					3367	
Sec.										

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	580	3422	#	0.17	0.28	953	0.61
Right								
Westbound								
Prot								
Perm								
Left	L	174	1770	#	0.10	0.13	231	0.75
Prot								
Perm								
Thru	T	608	3547		0.17	0.47	1681	0.36
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	980	3367	#	0.29	0.38	1274	0.77
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.56
Total lost time per cycle, L = 13.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.71

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	0.61	0.28	20.4	1.000	953	0.19	1.1	0.0	21.5	C	21.5	C
Westbound												
L	0.75	0.13	27.2	1.000	231	0.31	13.1	0.0	40.3	D		
T	0.36	0.47	10.9	1.000	1681	0.11	0.1	0.0	11.0	B	17.5	B
Northbound												
Southbound												

LTR 0.77 0.38 17.7 1.000 1274 0.32 2.9 0.0 20.6 C 20.6 C

Intersection delay = 19.8 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.097
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	23.4	20.4	0.00	0.0	0.0	21.5
	0.0						0.0	
Westbound								
L	0.0	0.00	28.3	27.2	0.00	0.0	0.0	40.3
T	0.0	0.00	17.1	10.9	0.00	0.0	0.0	11.0
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LTR	0.0	0.00	20.2	17.7	0.00	0.0	0.0	20.6
	0.0						0.0	

Intersection Delay 19.8 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup	TR	L T		LTR
Init Queue	0.0	0.0 0.0		0.0
Flow Rate	304	174 319		514
So	1900	1900 1900		1900
No.Lanes	0 2 0	1 2 0	0 0 0	0 2 0
SL	1797	1770 1862		1768
LnCapacity	500	231 882		669
Flow Ratio	0.2	0.1 0.2		0.3
v/c Ratio	0.61	0.75 0.36		0.77
Grn Ratio	0.28	0.13 0.47		0.38
I Factor	1.000	1.000		1.000
AT or PVG	3	3 3		3
Pltn Ratio	1.00	1.00 1.00		1.00
PF2	1.00	1.00 1.00		1.00
Q1	4.8	3.0 3.7		8.1
kB	0.4	0.2 0.5		0.4
Q2	0.6	0.7 0.3		1.4
Q Average	5.3	3.7 4.0		9.5
Q Spacing	25.0	25.0 25.0		25.0
Q Storage	0	0 0		0
Q S Ratio				
70th Percentile Output:				
fB%	1.2	1.2 1.2		1.2
BOQ	6.3	4.4 4.7		11.2
QSRatio				
85th Percentile Output:				
fB%	1.6	1.6 1.6		1.5
BOQ	8.3	5.8 6.2		14.4
QSRatio				
90th Percentile Output:				
fB%	1.7	1.7 1.7		1.6
BOQ	9.1	6.4 6.8		15.7
QSRatio				
95th Percentile Output:				
fB%	1.9	2.0 2.0		1.9
BOQ	10.4	7.3 7.8		17.6
QSRatio				
98th Percentile Output:				
fB%	2.4	2.5 2.4		2.2
BOQ	12.6	9.0 9.6		20.7
QSRatio				

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: SR-55 NB Ramps

Inter.: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Volume		1329	606		514	246	987		694			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru				
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right	A	A			EB Right	A			
SB Right					WB Right	A			
Green	21.3	4.5	0.0			23.6	0.0		
Yellow	4.5	4.5				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1708	3547	0.82	0.48	17.7	B	12.2	B
R	1583	1583	0.40	1.00	0.2	A		
Westbound								
T	2443	5074	0.22	0.48	9.8	A	6.7	A
R	1583	1583	0.16	1.00	0.0+	A		
Northbound								
L	1248	3437	0.83	0.36	23.9	C		
							14.1	B
R	1583	1583	0.46	1.00	0.2	A		
Southbound								

Intersection Delay = 12.0 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Macarthur at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: SR-55 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1329	606		514	246	987		694			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		350	159		135	65	260		183			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900		1900			
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			
Adj Flow		1399	638		541	259	1039		731			
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			
Peds Bikes	0			0			0			0		
Buses		0	0		0	0	0		0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0		0.0			
Arriv. Type		3	3		3	3	3		3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0		3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0		2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0		2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right	A		
SB Right					WB Right	A		
Green	21.3	4.5	0.0			23.6	0.0	
Yellow	4.5	4.5				3.6		
All Red	1.0	1.0				1.0		

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1329	606		514	246	987		694			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		1399	638		541	259	1039		731			
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
Lane group		T	R		T	R	L		R			
Adj flow		1399	638		541	259	1039		731			
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R		L	R				
So	1900	1900		1900	1900		1900	1900				
Lanes	0 2	1	0	3	1	0	2	1	0	0	0	
fW	1.000	1.000		1.000	1.000		1.000	1.000				
fHV	0.980	0.980		0.980	0.980		0.980	0.980				
fG	1.000	1.000		1.000	1.000		1.000	1.000				
fP	1.000	1.000		1.000	1.000		1.000	1.000				
fBB	1.000	1.000		1.000	1.000		1.000	1.000				
fA	1.000	1.000		1.000	1.000		1.000	1.000				
fLU	0.952	1.000		0.908	1.000		0.971	1.000				
fRT	1.000	0.850		1.000	0.850			0.850				
fLT	1.000			1.000			0.950					
Sec.												
fLpb	1.000			1.000			1.000					
fRpb	1.000	1.000		1.000	1.000			1.000				
S	3547	1583		5074	1583		3437	1583				
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1399	3547	#	0.39	0.48	1708	0.82
Right	R	638	1583		0.40	1.00	1583	0.40
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	541	5074		0.11	0.48	2443	0.22
Right	R	259	1583		0.16	1.00	1583	0.16
Northbound								
Prot								
Perm								
Left	L	1039	3437	#	0.30	0.36	1248	0.83
Prot								
Perm								
Thru								
Right	R	731	1583		0.46	1.00	1583	0.46
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.70
Total lost time per cycle, L = 10.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.82

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.82	0.48	14.4	1.000	1708	0.36	3.3	0.0	17.7	B	12.2	B
R	0.40	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Westbound												
T	0.22	0.48	9.8	1.000	2443	0.11	0.0	0.0	9.8	A	6.7	A
R	0.16	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Northbound												
L	0.83	0.36	18.9	1.000	1248	0.37	5.0	0.0	23.9	C		
											14.1	B
R	0.46	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

Intersection delay = 12.0 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	16.9	14.4	0.00	0.0	0.0	17.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
	0.0						0.0	
T	0.0	0.00	16.9	9.8	0.00	0.0	0.0	9.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Northbound								
L	0.0	0.00	20.7	18.9	0.00	0.0	0.0	23.9
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 12.0 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound			Southbound		
LaneGroup	T	R	T	R	L		R			
Init Queue	0.0	0.0	0.0	0.0	0.0		0.0			
Flow Rate	734	638	198	259	535		731			
So	1900	1900	1900	1900	1900		1900			
No.Lanes	0 2	1	0 3	1	2	0 1		0	0	0
SL	1862	1583	1862	1583	1770		1583			
LnCapacity	897	1583	896	1583	642		1583			
Flow Ratio	0.4	0.4	0.1	0.2	0.3		0.5			
v/c Ratio	0.82	0.40	0.22	0.16	0.83		0.46			
Grn Ratio	0.48	1.00	0.48	1.00	0.36		1.00			
I Factor	1.000		1.000		1.000					
AT or PVG	3	3	3	3	3		3			
Pltn Ratio	1.00	1.00	1.00	1.00	1.00		1.00			
PF2	1.00		1.00		1.00					
Q1	11.3		2.1		8.8					
kB	0.5	0.7	0.5	0.7	0.4		0.7			
Q2	2.2	0.5	0.2	0.1	1.9		0.6			
Q Average	13.5		2.2		10.7					
Q Spacing	25.0	25.0	25.0	25.0	25.0		25.0			
Q Storage	0	0	0	0	0		0			
Q S Ratio										
70th Percentile Output:										
fB%	1.2		1.2		1.2					
BOQ	15.8		2.7		12.6					
QSRatio										
85th Percentile Output:										
fB%	1.5		1.6		1.5					
BOQ	20.1		3.5		16.2					
QSRatio										
90th Percentile Output:										
fB%	1.6		1.8		1.6					
BOQ	21.7		3.9		17.5					
QSRatio										
95th Percentile Output:										
fB%	1.8		2.0		1.8					
BOQ	24.1		4.5		19.6					
QSRatio										
98th Percentile Output:										
fB%	2.1		2.5		2.1					
BOQ	27.7		5.7		22.9					
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: SR-55 NB Ramps

Inter.: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Volume		772	740		1575	1148	656		240			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru				
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right	A	A			EB Right	A			
SB Right					WB Right	A			
Green	20.4	7.0	0.0			17.0	0.0		
Yellow	4.5	4.5				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1945	3547	0.42	0.55	8.1	A	4.2	A
R	1583	1583	0.49	1.00	0.2	A		
Westbound								
T	2782	5074	0.60	0.55	9.4	A	6.4	A
R	1583	1583	0.76	1.00	2.3	A		
Northbound								
L	974	3437	0.71	0.28	21.7	C		
							15.9	B
R	1583	1583	0.16	1.00	0.0+	A		
Southbound								

Intersection Delay = 7.4 (sec/veh) Intersection LOS = A

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	PM Peak Hour
Intersection:	Macarthur at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: SR-55 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		772	740		1575	1148	656		240			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		203	195		414	302	173		63			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900		1900			
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			
Adj Flow		813	779		1658	1208	691		253			
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0	0	0		0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0		0.0			
Arriv. Type		3	3		3	3	3		3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0		3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0		2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0		2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right	A		
SB Right					WB Right	A		
Green	20.4	7.0	0.0			17.0	0.0	
Yellow	4.5	4.5				3.6		
All Red	1.0	1.0				1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		772	740		1575	1148	656		240			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		813	779		1658	1208	691		253			
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
Lane group		T	R		T	R	L		R			
Adj flow		813	779		1658	1208	691		253			
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R		L	R				
So	1900	1900		1900	1900		1900	1900				
Lanes	0 2	1	0	3	1	0	2	1	0	0	0	
fW	1.000	1.000		1.000	1.000		1.000	1.000				
fHV	0.980	0.980		0.980	0.980		0.980	0.980				
fG	1.000	1.000		1.000	1.000		1.000	1.000				
fP	1.000	1.000		1.000	1.000		1.000	1.000				
fBB	1.000	1.000		1.000	1.000		1.000	1.000				
fA	1.000	1.000		1.000	1.000		1.000	1.000				
fLU	0.952	1.000		0.908	1.000		0.971	1.000				
fRT	1.000	0.850		1.000	0.850			0.850				
fLT	1.000			1.000			0.950					
Sec.												
fLpb	1.000			1.000			1.000					
fRpb	1.000	1.000		1.000	1.000			1.000				
S	3547	1583		5074	1583		3437	1583				
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	813	3547		0.23	0.55	1945	0.42
Right	R	779	1583		0.49	1.00	1583	0.49
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1658	5074		0.33	0.55	2782	0.60
Right	R	1208	1583	#	0.76	1.00	1583	0.76
Northbound								
Prot								
Perm								
Left	L	691	3437		0.20	0.28	974	0.71
Prot								
Perm								
Thru								
Right	R	253	1583		0.16	1.00	1583	0.16
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.76
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.76

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.42	0.55	7.9	1.000	1945	0.11	0.1	0.0	8.1	A	4.2	A
R	0.49	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Westbound												
T	0.60	0.55	9.1	1.000	2782	0.18	0.4	0.0	9.4	A	6.4	A
R	0.76	1.00	0.0	0.950	1583	0.32	2.3	0.0	2.3	A		
Northbound												
L	0.71	0.28	19.3	1.000	974	0.27	2.4	0.0	21.7	C		
											15.9	B
R	0.16	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Southbound												

Intersection delay = 7.4 (sec/veh) Intersection LOS = A

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	13.5	7.9	0.00	0.0	0.0	8.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
	0.0						0.0	
T	0.0	0.00	13.5	9.1	0.00	0.0	0.0	9.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.3
Northbound								
L	0.0	0.00	21.5	19.3	0.00	0.0	0.0	21.7
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 7.4 sec/veh Intersection LOS A

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	T	R	T	R	L	R		
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0		
Flow Rate	426	779	608	1208	355	253		
So	1900	1900	1900	1900	1900	1900		
No.Lanes	0 2	1	0 3	1	2 0	1	0 0	0
SL	1862	1583	1862	1583	1770	1583		
LnCapacity	1021	1583	1021	1583	501	1583		
Flow Ratio	0.2	0.5	0.3	0.8	0.2	0.2		
v/c Ratio	0.42	0.49	0.60	0.76	0.71	0.16		
Grn Ratio	0.55	1.00	0.55	1.00	0.28	1.00		
I Factor	1.000		1.000		1.000			
AT or PVG	3	3	3	3	3	3		
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
PF2	1.00		1.00		1.00			
Q1	4.2		6.8		5.3			
kB	0.5	0.7	0.5	0.7	0.4	0.7		
Q2	0.4	0.7	0.8	2.2	0.8	0.1		
Q Average	4.5		7.6		6.1			
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0		
Q Storage	0	0	0	0	0	0		
Q S Ratio								
70th Percentile Output:								
fB%	1.2		1.2		1.2			
BOQ	5.4		9.0		7.3			
QSRatio								
85th Percentile Output:								
fB%	1.6		1.5		1.5			
BOQ	7.1		11.6		9.5			
QSRatio								
90th Percentile Output:								
fB%	1.7		1.7		1.7			
BOQ	7.8		12.7		10.4			
QSRatio								
95th Percentile Output:								
fB%	2.0		1.9		1.9			
BOQ	8.9		14.4		11.8			
QSRatio								
98th Percentile Output:								
fB%	2.4		2.3		2.3			
BOQ	10.9		17.1		14.3			
QSRatio								

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: SR-55 SB Ramps

Inter.: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Volume		1208	695		1140	135				926		905
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	13.2	7.3	0.0		24.0	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1537	3547	0.83	0.43	18.9	B	12.1	B
R	1583	1583	0.46	1.00	0.2	A		
Westbound								
T	2199	5074	0.55	0.43	12.9	B	11.5	B
R	1583	1583	0.09	1.00	0.0+	A		
Northbound								
Southbound								
L	1375	3437	0.71	0.40	16.8	B		
							19.7	B
R	1121	2803	0.85	0.40	22.7	C		

Intersection Delay = 14.7 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Macarthur at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: SR-55 SB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1208	695		1140	135				926		905
% Heavy Veh		2	2		2	2				2		2
PHF		0.95	0.95		0.95	0.95				0.95		0.95
PK 15 Vol		318	183		300	36				244		238
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900		1900	1900				1900		1900
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
LGConfig		T	R		T	R				L		R
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0
Adj Flow		1272	732		1200	142				975		953
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000
Peds Bikes	0			0			0			0		
Buses		0	0		0	0				0		0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0				0.0		0.0
Arriv. Type		3	3		3	3				3		3
Unit Ext.		3.0	3.0		3.0	3.0				3.0		3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0		2.0	2.0				2.0		2.0
Ext of g		2.0	2.0		2.0	2.0				2.0		2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	13.2	7.3	0.0		24.0	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1208	695		1140	135				926		905
PHF		0.95	0.95		0.95	0.95				0.95		0.95
Adj flow		1272	732		1200	142				975		953
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
Lane group		T	R		T	R				L		R
Adj flow		1272	732		1200	142				975		953
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R					L		R
So	1900	1900		1900	1900					1900		1900
Lanes	0 2	1	0	3	1	0	0	0		2	0	2
fW	1.000	1.000		1.000	1.000					1.000		1.000
fHV	0.980	0.980		0.980	0.980					0.980		0.980
fG	1.000	1.000		1.000	1.000					1.000		1.000
fP	1.000	1.000		1.000	1.000					1.000		1.000
fBB	1.000	1.000		1.000	1.000					1.000		1.000
fA	1.000	1.000		1.000	1.000					1.000		1.000
fLU	0.952	1.000		0.908	1.000					0.971		0.885
fRT	1.000	0.850		1.000	0.850							0.850
fLT	1.000			1.000						0.950		
Sec.												
fLpb	1.000			1.000						1.000		
fRpb	1.000	1.000		1.000	1.000							1.000
S	3547	1583		5074	1583					3437		2803
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1272	3547	#	0.36	0.43	1537	0.83
Right	R	732	1583		0.46	1.00	1583	0.46
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1200	5074		0.24	0.43	2199	0.55
Right	R	142	1583		0.09	1.00	1583	0.09
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	975	3437		0.28	0.40	1375	0.71
Prot								
Perm								
Thru								
Right	R	953	2803	#	0.34	0.40	1121	0.85

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.70
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.84

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.83	0.43	15.0	1.000	1537	0.37	3.9	0.0	18.9	B	12.1	B
R	0.46	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Westbound												
T	0.55	0.43	12.6	1.000	2199	0.15	0.3	0.0	12.9	B	11.5	B
R	0.09	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Northbound												
Southbound												
L	0.71	0.40	15.1	1.000	1375	0.27	1.7	0.0	16.8	B		

									19.7	B
R	0.85	0.40	16.4	1.000	1121	0.38	6.4	0.0	22.7	C

Intersection delay = 14.7 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	17.0	15.0	0.00	0.0	0.0	18.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
	0.0						0.0	
T	0.0	0.00	17.0	12.6	0.00	0.0	0.0	12.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
L	0.0	0.00	18.0	15.1	0.00	0.0	0.0	16.8
	0.0						0.0	
R	0.0	0.00	18.0	16.4	0.00	0.0	0.0	22.7

Intersection Delay 14.7 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	T	R	T	R			L	R
Init Queue	0.0	0.0	0.0	0.0			0.0	0.0
Flow Rate	668	732	440	142			502	538
So	1900	1900	1900	1900			1900	1900
No.Lanes	0 2	1	0 3	1	0 0	0	2 0	2
SL	1862	1583	1862	1583			1770	1584
LnCapacity	807	1583	807	1583			708	633
Flow Ratio	0.4	0.5	0.2	0.1			0.3	0.3
v/c Ratio	0.83	0.46	0.55	0.09			0.71	0.85
Grn Ratio	0.43	1.00	0.43	1.00			0.40	0.40
I Factor	1.000		1.000				1.000	
AT or PVG	3	3	3	3			3	3
Pltn Ratio	1.00	1.00	1.00	1.00			1.00	1.00
PF2	1.00		1.00				1.00	1.00
Q1	9.8		5.4				7.0	8.2
kB	0.5	0.7	0.5	0.7			0.4	0.4
Q2	2.0	0.6	0.6	0.1			1.0	2.0
Q Average	11.9		6.0				8.0	10.1
Q Spacing	25.0	25.0	25.0	25.0			25.0	25.0
Q Storage	0	0	0	0			0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2		1.2				1.2	1.2
BOQ	14.0		7.1				9.5	11.9
QSRatio								
85th Percentile Output:								
fB%	1.5		1.5				1.5	1.5
BOQ	17.8		9.3				12.3	15.4
QSRatio								
90th Percentile Output:								
fB%	1.6		1.7				1.7	1.6
BOQ	19.3		10.2				13.4	16.6
QSRatio								
95th Percentile Output:								
fB%	1.8		1.9				1.9	1.8
BOQ	21.5		11.6				15.1	18.7
QSRatio								
98th Percentile Output:								
fB%	2.1		2.3				2.2	2.2
BOQ	25.0		14.0				18.0	21.9
QSRatio								

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: SR-55 SB Ramps

Inter.: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Volume		1116	947		1662	658				323		739
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	17.1	7.5	0.0		19.9	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1779	3547	0.66	0.50	12.1	B	6.9	A
R	1583	1583	0.63	1.00	0.8	A		
Westbound								
T	2545	5074	0.69	0.50	12.2	B	8.8	A
R	1583	1583	0.44	1.00	0.2	A		
Northbound								
Southbound								
L	1140	3437	0.30	0.33	15.0	B		
							22.2	C
R	930	2803	0.84	0.33	25.3	C		

Intersection Delay = 10.7 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/30/09
Analysis Time Period: PM Peak Hour
Intersection: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2008
Project ID: IBC Vision Traffic Study - Existing

E/W St: SR-55 SB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1116	947		1662	658				323	739	
% Heavy Veh		2	2		2	2				2	2	
PHF		0.95	0.95		0.95	0.95				0.95	0.95	
PK 15 Vol		294	249		437	173				85	194	
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900		1900	1900				1900	1900	
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0
Adj Flow		1175	997		1749	693				340		778
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000
Peds Bikes	0			0			0			0		
Buses		0	0		0	0				0		0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0				0.0		0.0
Arriv. Type		3	3		3	3				3		3
Unit Ext.		3.0	3.0		3.0	3.0				3.0		3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0		2.0	2.0				2.0		2.0
Ext of g		2.0	2.0		2.0	2.0				2.0		2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	17.1	7.5	0.0		19.9	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1116	947		1662	658				323	739	
PHF		0.95	0.95		0.95	0.95				0.95	0.95	
Adj flow		1175	997		1749	693				340	778	
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
Lane group		T	R		T	R				L		R
Adj flow		1175	997		1749	693				340		778
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R					L		R
So	1900	1900		1900	1900					1900		1900
Lanes	0 2	1	0	3	1	0	0	0		2	0	2
fW	1.000	1.000		1.000	1.000					1.000		1.000
fHV	0.980	0.980		0.980	0.980					0.980		0.980
fG	1.000	1.000		1.000	1.000					1.000		1.000
fP	1.000	1.000		1.000	1.000					1.000		1.000
fBB	1.000	1.000		1.000	1.000					1.000		1.000
fA	1.000	1.000		1.000	1.000					1.000		1.000
fLU	0.952	1.000		0.908	1.000					0.971		0.885
fRT	1.000	0.850		1.000	0.850							0.850
fLT	1.000			1.000						0.950		
Sec.												
fLpb	1.000			1.000						1.000		
fRpb	1.000	1.000		1.000	1.000							1.000
S	3547	1583		5074	1583					3437		2803
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1175	3547		0.33	0.50	1779	0.66
Right	R	997	1583	#	0.63	1.00	1583	0.63
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1749	5074		0.34	0.50	2545	0.69
Right	R	693	1583		0.44	1.00	1583	0.44
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	340	3437		0.10	0.33	1140	0.30
Prot								
Perm								
Thru								
Right	R	778	2803		0.28	0.33	930	0.84

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.63
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.63

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.66	0.50	11.1	1.000	1779	0.24	0.9	0.0	12.1	B	6.9	A
R	0.63	1.00	0.0	0.950	1583	0.21	0.8	0.0	0.8	A		
Westbound												
T	0.69	0.50	11.4	1.000	2545	0.26	0.8	0.0	12.2	B	8.8	A
R	0.44	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Northbound												
Southbound												
L	0.30	0.33	14.9	1.000	1140	0.11	0.1	0.0	15.0	B		

										22.2	C
R	0.84	0.33	18.5	1.000	930	0.37	6.8	0.0	25.3	C	

Intersection delay = 10.7 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	14.9	11.1	0.00	0.0	0.0	12.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.8
Westbound								
	0.0						0.0	
T	0.0	0.00	14.9	11.4	0.00	0.0	0.0	12.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
L	0.0	0.00	20.1	14.9	0.00	0.0	0.0	15.0
	0.0						0.0	
R	0.0	0.00	20.1	18.5	0.00	0.0	0.0	25.3

Intersection Delay 10.7 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound			Southbound		
LaneGroup	T	R	T	R				L		R
Init Queue	0.0	0.0	0.0	0.0				0.0		0.0
Flow Rate	617	997	642	693				175		439
So	1900	1900	1900	1900				1900		1900
No.Lanes	0 2	1	0 3	1	0	0	0	2	0	2
SL	1862	1583	1862	1583				1770		1584
LnCapacity	934	1583	934	1583				587		525
Flow Ratio	0.3	0.6	0.3	0.4				0.1		0.3
v/c Ratio	0.66	0.63	0.69	0.44				0.30		0.84
Grn Ratio	0.50	1.00	0.50	1.00				0.33		0.33
I Factor	1.000		1.000					1.000		
AT or PVG	3	3	3	3				3		3
Pltn Ratio	1.00	1.00	1.00	1.00				1.00		1.00
PF2	1.00		1.00					1.00		1.00
Q1	7.7		8.1					2.2		6.8
kB	0.5	0.7	0.5	0.7				0.4		0.4
Q2	1.0	1.2	1.1	0.6				0.2		1.6
Q Average	8.7		9.2					2.3		8.4
Q Spacing	25.0	25.0	25.0	25.0				25.0		25.0
Q Storage	0	0	0	0				0		0
Q S Ratio										
70th Percentile Output:										
fB%	1.2		1.2					1.2		1.2
BOQ	10.2		10.9					2.8		9.9
QSRatio										
85th Percentile Output:										
fB%	1.5		1.5					1.6		1.5
BOQ	13.2		14.1					3.7		12.8
QSRatio										
90th Percentile Output:										
fB%	1.7		1.7					1.8		1.7
BOQ	14.4		15.3					4.1		14.0
QSRatio										
95th Percentile Output:										
fB%	1.9		1.9					2.0		1.9
BOQ	16.2		17.2					4.7		15.8
QSRatio										
98th Percentile Output:										
fB%	2.2		2.2					2.5		2.2
BOQ	19.2		20.3					5.9		18.7
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: SR-55 NB Ramps

Inter.: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Dyer Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	3	1	0	3	0	1	0	1	0	0	0
LGConfig		T	R		TR		L	LR	R			
Volume		1856	551		820	325	815		679			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left A			
Thru	A	A			Thru			
Right	A	A			Right A			
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right A			
SB Right					WB Right			
Green	22.3	11.3	0.0		46.8	0.0		
Yellow	4.0	4.0			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	2062	5074	0.95	0.41	37.4	D	28.8	C
R	1583	1583	0.37	1.00	0.1	A		
Westbound								
TR	1974	4858	0.61	0.41	22.8	C	22.8	C
Northbound								
L	872	1770	0.98	0.49	50.2	D		
LR	936	1900	0.00	0.49	12.2	B	44.6	D
R	780	1583	0.92	0.49	37.9	D		
Southbound								

Intersection Delay = 32.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Dyer at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: SR-55 NB Ramps N/S St: Dyer Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1856	551		820	325	815		679			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		488	145		216	86	214		179			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900		1900	1900	1900			
ParkExist												
NumPark												
No. Lanes	0	3	1	0	3	0	1	0	1	0	0	0
LGConfig		T	R		TR		L	LR	R			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			
Adj Flow		1954	580		1205		858	0	715			
%InSharedLn							0		0			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.284			0.000	1.000			
Peds Bikes	0			0			0			0		
Buses		0	0		0		0	0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0		0.0	0.0	0.0			
Arriv. Type		3	3		3		3	3	3			
Unit Ext.		3.0	3.0		3.0		3.0	3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0		2.0	2.0	2.0			
Ext of g		2.0	2.0		2.0		2.0	2.0	2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right			
Green	22.3	11.3	0.0			46.8	0.0	
Yellow	4.0	4.0				3.6		
All Red	1.0	1.0				1.0		

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1856	551		820	325	815		679			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		1954	580		863	342	858		715			
No. Lanes	0	3	1	0	3	0	1	0	1	0	0	0
Lane group		T	R		TR		L	LR	R			
Adj flow		1954	580		1205		858	0	715			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.284			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		TR			L	LR	R			
So	1900	1900		1900			1900	1900	1900			
Lanes	0 3	1	0	3	0		1	0	1	0	0	0
fW	1.000	1.000		1.000			1.000	1.000	1.000			
fHV	0.980	0.980		0.980			0.980	1.000	0.980			
fG	1.000	1.000		1.000			1.000	1.000	1.000			
fP	1.000	1.000		1.000			1.000	1.000	1.000			
fBB	1.000	1.000		1.000			1.000	1.000	1.000			
fA	1.000	1.000		1.000			1.000	1.000	1.000			
fLU	0.908	1.000		0.908			1.000	1.000	1.000			
fRT	1.000	0.850		0.957				1.000	0.850			
fLT	1.000			1.000			0.950	1.000				
Sec.												
fLpb	1.000			1.000			1.000	1.000				
fRpb	1.000	1.000		1.000				1.000	1.000			
S	5074	1583		4858			1770	1900	1583			
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1954	5074	#	0.39	0.41	2062	0.95
Right	R	580	1583		0.37	1.00	1583	0.37
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1205	4858		0.25	0.41	1974	0.61
Right								
Northbound								
Prot								
Perm								
Left	L	858	1770	#	0.48	0.49	872	0.98
Prot								
Perm								
Thru	LR	0	1900		0.00	0.49	936	0.00
Right	R	715	1583		0.45	0.49	780	0.92
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.87
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.97

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.95	0.41	27.2	1.000	2062	0.46	10.1	0.0	37.4	D	28.8	C
R	0.37	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Westbound												
TR	0.61	0.41	22.3	1.000	1974	0.20	0.6	0.0	22.8	C	22.8	C
Northbound												
L	0.98	0.49	23.7	1.000	872	0.49	26.5	0.0	50.2	D		
LR	0.00	0.49	12.2	1.000	936	0.11	0.0	0.0	12.2	B	44.6	D
R	0.92	0.49	22.3	1.000	780	0.44	15.6	0.0	37.9	D		
Southbound												

Intersection delay = 32.1 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	28.2	27.2	0.00	0.0	0.0	37.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Westbound								
	0.0						0.0	
TR	0.0	0.00	28.2	22.3	0.00	0.0	0.0	22.8
	0.0						0.0	
Northbound								
L	0.0	0.00	24.1	23.7	0.00	0.0	0.0	50.2
LR	0.0	0.00	24.1	12.2	0.00	0.0	0.0	12.2
R	0.0	0.00	24.1	22.3	0.00	0.0	0.0	37.9
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 32.1 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound	Northbound			Southbound
LaneGroup	T	R	TR	L	LR	R	
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate	717	580	442	858	0	715	
So	1900	1900	1900	1900	1900	1900	
No.Lanes	0 3	1	0 3 0	1	0	1	0 0 0
SL	1862	1583	1783	1770	1900	1583	
LnCapacity	756	1583	724	872	936	780	
Flow Ratio	0.4	0.4	0.2	0.5	0.0	0.5	
v/c Ratio	0.95	0.37	0.61	0.98	0.00	0.92	
Grn Ratio	0.41	1.00	0.41	0.49	0.49	0.49	
I Factor	1.000		1.000		1.000		
AT or PVG	3	3	3	3	3	3	
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF2	1.00		1.00	1.00	1.00	1.00	
Q1	18.3		9.2	22.3	0.0	17.5	
kB	0.6	0.9	0.6	0.7	0.7	0.6	
Q2	5.3	0.5	0.9	7.6	0.0	4.4	
Q Average	23.6		10.1	29.9	0.0	21.8	
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage	0	0	0	0	0	0	
Q S Ratio							
70th Percentile Output:							
fB%	1.2		1.2	1.1	1.2	1.2	
BOQ	27.2		11.9	34.3	0.0	25.3	
QSRatio							
85th Percentile Output:							
fB%	1.4		1.5	1.4	1.6	1.4	
BOQ	33.9		15.3	42.1	0.0	31.6	
QSRatio							
90th Percentile Output:							
fB%	1.5		1.6	1.5	1.8	1.5	
BOQ	35.9		16.6	44.5	0.0	33.5	
QSRatio							
95th Percentile Output:							
fB%	1.7		1.8	1.6	2.1	1.7	
BOQ	39.2		18.6	48.2	0.0	36.7	
QSRatio							
98th Percentile Output:							
fB%	1.9		2.2	1.8	2.7	1.9	
BOQ	43.9		21.8	53.8	0.0	41.2	
QSRatio							

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: SR-55 NB Ramps

Inter.: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Dyer Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	3	1	0	3	0	1	0	1	0	0	0
LGConfig		T	R		TR		L	LR	R			
Volume		935	1023		1488	1205	219		66			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru				
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right					EB Right	A			
SB Right					WB Right				
Green	19.5	25.0	0.0			10.9	0.0		
Yellow	4.0	4.0				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 70.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	3588	5074	0.27	0.71	3.8	A	2.4	A
R	1583	1583	0.68	1.00	1.2	A		
Westbound								
TR	3348	4734	0.85	0.71	9.7	A	9.7	A
Northbound								
L	276	1770	0.84	0.16	48.4	D		
LR	296	1900	0.00	0.16	24.9	C	43.4	D
R	246	1583	0.28	0.16	26.7	C		
Southbound								

Intersection Delay = 8.7 (sec/veh) Intersection LOS = A

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	PM Peak Hour
Intersection:	Dyer at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: SR-55 NB Ramps N/S St: Dyer Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		935	1023		1488	1205	219		66			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		246	269		392	317	58		17			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900		1900	1900	1900			
ParkExist												
NumPark												
No. Lanes	0	3	1	0	3	0	1	0	1	0	0	0
LGConfig		T	R		TR		L		LR	R		
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			
Adj Flow		984	1077		2834		231	0	69			
%InSharedLn							0		0			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.447			0.000	1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0		0	0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0		0.0	0.0	0.0			
Arriv. Type		3	3		3		3	3	3			
Unit Ext.		3.0	3.0		3.0		3.0	3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0		2.0	2.0	2.0			
Ext of g		2.0	2.0		2.0		2.0	2.0	2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right			
Green	19.5	25.0	0.0			10.9	0.0	
Yellow	4.0	4.0				3.6		
All Red	1.0	1.0				1.0		

Cycle Length: 70.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		935	1023		1488	1205	219		66			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		984	1077		1566	1268	231		69			
No. Lanes	0	3	1	0	3	0	1	0	1	0	0	0
Lane group		T	R		TR		L		LR	R		
Adj flow		984	1077		2834		231	0	69			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.447			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		TR			L	LR	R			
So	1900	1900		1900			1900	1900	1900			
Lanes	0 3	0 1	0	0 3	0		0 1	0	0 1	0	0	0
fW	1.000	1.000		1.000			1.000	1.000	1.000			
fHV	0.980	0.980		0.980			0.980	1.000	0.980			
fG	1.000	1.000		1.000			1.000	1.000	1.000			
fP	1.000	1.000		1.000			1.000	1.000	1.000			
fBB	1.000	1.000		1.000			1.000	1.000	1.000			
fA	1.000	1.000		1.000			1.000	1.000	1.000			
fLU	0.908	1.000		0.908			1.000	1.000	1.000			
fRT	1.000	0.850		0.933				1.000	0.850			
fLT	1.000			1.000			0.950	1.000				
Sec.												
fLpb	1.000			1.000			1.000	1.000				
fRpb	1.000	1.000		1.000				1.000	1.000			
S	5074	1583		4734			1770	1900	1583			
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	984	5074		0.19	0.71	3588	0.27
Right	R	1077	1583		0.68	1.00	1583	0.68
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	2834	4734	#	0.60	0.71	3348	0.85
Right								
Northbound								
Prot								
Perm								
Left	L	231	1770	#	0.13	0.16	276	0.84
Prot								
Perm								
Thru	LR	0	1900		0.00	0.16	296	0.00
Right	R	69	1583		0.04	0.16	246	0.28
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.73
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.85

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.27	0.71	3.7	1.000	3588	0.11	0.0	0.0	3.8	A	2.4	A
R	0.68	1.00	0.0	0.950	1583	0.25	1.2	0.0	1.2	A		
Westbound												
TR	0.85	0.71	7.5	1.000	3348	0.38	2.2	0.0	9.7	A	9.7	A
Northbound												
L	0.84	0.16	28.7	1.000	276	0.37	19.7	0.0	48.4	D		
LR	0.00	0.16	24.9	1.000	296	0.11	0.0	0.0	24.9	C	43.4	D
R	0.28	0.16	26.1	1.000	246	0.11	0.6	0.0	26.7	C		
Southbound												

Intersection delay = 8.7 (sec/veh) Intersection LOS = A

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 70.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 70.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	70.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	10.3	3.7	0.00	0.0	0.0	3.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.2
Westbound								
	0.0						0.0	
TR	0.0	0.00	10.3	7.5	0.00	0.0	0.0	9.7
	0.0						0.0	
Northbound								
L	0.0	0.00	29.6	28.7	0.00	0.0	0.0	48.4
LR	0.0	0.00	29.6	24.9	0.00	0.0	0.0	24.9
R	0.0	0.00	29.6	26.1	0.00	0.0	0.0	26.7
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 8.7 sec/veh Intersection LOS A

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound	Northbound			Southbound
LaneGroup	T	R	TR	L	LR	R	
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate	361	1077	1040	231	0	69	
So	1900	1900	1900	1900	1900	1900	
No.Lanes	0 3	1	0 3 0	1	0	1	0 0 0
SL	1862	1583	1737	1770	1900	1583	
LnCapacity	1317	1583	1229	276	296	246	
Flow Ratio	0.2	0.7	0.6	0.1	0.0	0.0	
v/c Ratio	0.27	0.68	0.85	0.84	0.00	0.28	
Grn Ratio	0.71	1.00	0.71	0.16	0.16	0.16	
I Factor	1.000		1.000		1.000		
AT or PVG	3	3	3	3	3	3	
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF2	1.00		1.00	1.00	1.00	1.00	
Q1	2.5		14.7	4.4	0.0	1.2	
kB	0.7	0.8	0.7	0.3	0.3	0.3	
Q2	0.3	1.6	3.2	1.2	0.0	0.1	
Q Average	2.8		18.0	5.5	0.0	1.3	
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage	0	0	0	0	0	0	
Q S Ratio							
70th Percentile Output:							
fB%	1.2		1.2	1.2	1.2	1.2	
BOQ	3.4		20.9	6.6	0.0	1.5	
QSRatio							
85th Percentile Output:							
fB%	1.6		1.5	1.5	1.6	1.6	
BOQ	4.4		26.4	8.6	0.0	2.0	
QSRatio							
90th Percentile Output:							
fB%	1.7		1.6	1.7	1.8	1.8	
BOQ	4.9		28.1	9.4	0.0	2.3	
QSRatio							
95th Percentile Output:							
fB%	2.0		1.7	1.9	2.1	2.1	
BOQ	5.7		31.0	10.7	0.0	2.6	
QSRatio							
98th Percentile Output:							
fB%	2.5		2.0	2.4	2.7	2.6	
BOQ	7.0		35.1	13.0	0.0	3.3	
QSRatio							

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: SR-55 SB Ramps

Inter.: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Grand Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Volume				352		363		805			566	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	19.4	0.0			10.9	14.2	0.0	
Yellow	3.6				4.0	4.0		
All Red	1.0				1.0	1.9		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
Westbound								
L	572	1770	0.65	0.32	20.0	B		
							22.0	C
R	512	1583	0.75	0.32	24.0	C		
Northbound								
T	1779	3547	0.48	0.50	10.0	A	10.0	A
Southbound								
T	2545	5074	0.23	0.50	8.5	A	8.5	A

Intersection Delay = 13.7 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/30/09
Analysis Time Period:	AM Peak Hour
Intersection:	Grand at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing

E/W St: SR-55 SB Ramps N/S St: Grand Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				352		363		805			566	
% Heavy Veh				2		2		2			2	
PHF				0.95		0.95		0.95			0.95	
PK 15 Vol				93		96		212			149	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900			1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						
Adj Flow				371		382		847			596	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	
Peds Bikes	0			0								
Buses				0		0		0			0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0			0.0	
Arriv. Type				3		3		3			3	
Unit Ext.				3.0		3.0		3.0			3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0			2.0	
Ext of g				2.0		2.0		2.0			2.0	
Ped Min g		3.2			3.2							

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right				
Peds					Peds				
WB Left	A				SB Left				
Thru					Thru	A	A		
Right	A				Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	19.4	0.0				10.9	14.2	0.0	
Yellow	3.6					4.0	4.0		
All Red	1.0					1.0	1.9		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				352		363		805			566	
PHF				0.95		0.95		0.95			0.95	
Adj flow				371		382		847			596	
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
Lane group				L		R		T			T	
Adj flow				371		382		847			596	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T			T		
So			1900		1900		1900			1900		
Lanes	0	0	1	0	1	0	2	0	0	3	0	
fW			1.000		1.000		1.000			1.000		
fHV			0.980		0.980		0.980			0.980		
fG			1.000		1.000		1.000			1.000		
fP			1.000		1.000		1.000			1.000		
fBB			1.000		1.000		1.000			1.000		
fA			1.000		1.000		1.000			1.000		
fLU			1.000		1.000		0.952			0.908		
fRT					0.850		1.000			1.000		
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000			1.000		
S			1770		1583		3547			5074		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	371	1770		0.21	0.32	572	0.65
Prot								
Perm								
Thru								
Right	R	382	1583	#	0.24	0.32	512	0.75
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	847	3547	#	0.24	0.50	1779	0.48
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	596	5074		0.12	0.50	2545	0.23
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.48
Total lost time per cycle, L = 10.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.58

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.65	0.32	17.4	1.000	572	0.23	2.6	0.0	20.0-	B		
											22.0	C
R	0.75	0.32	18.1	1.000	512	0.30	5.9	0.0	24.0	C		
Northbound												
T	0.48	0.50	9.8	1.000	1779	0.11	0.2	0.0	10.0-	A	10.0-	A
Southbound												

T 0.23 0.50 8.4 1.000 2545 0.11 0.0 0.0 8.5 A 8.5 A

Intersection delay = 13.7 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	20.3	17.4	0.00	0.0	0.0	20.0-
	0.0						0.0	
R	0.0	0.00	20.3	18.1	0.00	0.0	0.0	24.0
Northbound								
	0.0						0.0	
T	0.0	0.00	15.0	9.8	0.00	0.0	0.0	10.0-
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	15.0	8.4	0.00	0.0	0.0	8.5
	0.0						0.0	

Intersection Delay 13.7 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound		Northbound	Southbound
LaneGroup		L	R	T	T
Init Queue		0.0	0.0	0.0	0.0
Flow Rate		371	382	444	218
So		1900	1900	1900	1900
No.Lanes	0 0 0	1 0 1		0 2 0	0 3 0
SL		1770	1583	1862	1862
LnCapacity		572	512	934	934
Flow Ratio		0.2	0.2	0.2	0.1
v/c Ratio		0.65	0.75	0.48	0.23
Grn Ratio		0.32	0.32	0.50	0.50
I Factor		1.000		1.000	1.000
AT or PVG		3	3	3	3
Pltn Ratio		1.00	1.00	1.00	1.00
PF2		1.00	1.00	1.00	1.00
Q1		5.3	5.7	4.8	2.1
kB		0.4	0.4	0.5	0.5
Q2		0.7	1.0	0.5	0.2
Q Average		6.0	6.7	5.3	2.2
Q Spacing		25.0	25.0	25.0	25.0
Q Storage		0	0	0	0
Q S Ratio					
70th Percentile Output:					
fB%		1.2	1.2	1.2	1.2
BOQ		7.1	7.9	6.3	2.6
QSRatio					
85th Percentile Output:					
fB%		1.5	1.5	1.6	1.6
BOQ		9.3	10.3	8.2	3.5
QSRatio					
90th Percentile Output:					
fB%		1.7	1.7	1.7	1.8
BOQ		10.2	11.3	9.1	3.9
QSRatio					
95th Percentile Output:					
fB%		1.9	1.9	1.9	2.0
BOQ		11.6	12.8	10.3	4.5
QSRatio					
98th Percentile Output:					
fB%		2.3	2.3	2.4	2.5
BOQ		14.0	15.4	12.6	5.6
QSRatio					

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/30/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Existing
E/W St: SR-55 SB Ramps

Inter.: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Grand Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Volume				328		245		725			713	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	18.1	0.0			15.0	11.4	0.0	
Yellow	3.6				4.0	4.0		
All Red	1.0				1.0	1.9		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	534	1770	0.65	0.30	20.9	C		
							20.0-	B
R	478	1583	0.54	0.30	18.7	B		
Northbound								
T	1856	3547	0.41	0.52	8.8	A	8.8	A
Southbound								
T	2655	5074	0.28	0.52	8.1	A	8.1	A

Intersection Delay = 11.7 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/30/09
Analysis Time Period: PM Peak Hour
Intersection: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2008
Project ID: IBC Vision Traffic Study - Existing

E/W St: SR-55 SB Ramps N/S St: Grand Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				328		245		725			713	
% Heavy Veh				2		2		2			2	
PHF				0.95		0.95		0.95			0.95	
PK 15 Vol				86		64		191			188	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900			1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						
Adj Flow				345		258		763			751	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	
Peds Bikes	0			0								
Buses				0		0		0			0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0			0.0	
Arriv. Type				3		3		3			3	
Unit Ext.				3.0		3.0		3.0			3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0			2.0	
Ext of g				2.0		2.0		2.0			2.0	
Ped Min g		3.2			3.2							

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		18.1	0.0			15.0	11.4	0.0
Yellow		3.6				4.0	4.0	
All Red		1.0				1.0	1.9	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				328		245		725			713	
PHF				0.95		0.95		0.95			0.95	
Adj flow				345		258		763			751	
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
Lane group				L		R		T			T	
Adj flow				345		258		763			751	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T			T		
So			1900		1900		1900			1900		
Lanes	0	0	1	0	1	0	2	0	0	3	0	
fW			1.000		1.000		1.000			1.000		
fHV			0.980		0.980		0.980			0.980		
fG			1.000		1.000		1.000			1.000		
fP			1.000		1.000		1.000			1.000		
fBB			1.000		1.000		1.000			1.000		
fA			1.000		1.000		1.000			1.000		
fLU			1.000		1.000		0.952			0.908		
fRT					0.850		1.000			1.000		
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000			1.000		
S			1770		1583		3547			5074		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	345	1770	#	0.19	0.30	534	0.65
Prot								
Perm								
Thru								
Right	R	258	1583		0.16	0.30	478	0.54
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	763	3547	#	0.22	0.52	1856	0.41
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	751	5074		0.15	0.52	2655	0.28
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.41
Total lost time per cycle, L = 10.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.50

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor Del k	d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.65	0.30	18.2	1.000	534	0.22	2.7	0.0	20.9	C		
											20.0-	B
R	0.54	0.30	17.5	1.000	478	0.14	1.2	0.0	18.7	B		
Northbound												
T	0.41	0.52	8.7	1.000	1856	0.11	0.1	0.0	8.8	A	8.8	A
Southbound												

T 0.28 0.52 8.0 1.000 2655 0.11 0.1 0.0 8.1 A 8.1 A

Intersection delay = 11.7 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	20.9	18.2	0.00	0.0	0.0	20.9
	0.0						0.0	
R	0.0	0.00	20.9	17.5	0.00	0.0	0.0	18.7
Northbound								
	0.0						0.0	
T	0.0	0.00	14.3	8.7	0.00	0.0	0.0	8.8
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	14.3	8.0	0.00	0.0	0.0	8.1
	0.0						0.0	

Intersection Delay 11.7 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound		Northbound	Southbound
LaneGroup		L	R	T	T
Init Queue		0.0	0.0	0.0	0.0
Flow Rate		345	258	400	275
So		1900	1900	1900	1900
No.Lanes	0 0 0	1 0 1		0 2 0	0 3 0
SL		1770	1583	1862	1862
LnCapacity		534	478	974	974
Flow Ratio		0.2	0.2	0.2	0.1
v/c Ratio		0.65	0.54	0.41	0.28
Grn Ratio		0.30	0.30	0.52	0.52
I Factor		1.000		1.000	1.000
AT or PVG		3	3	3	3
Pltn Ratio		1.00	1.00	1.00	1.00
PF2		1.00	1.00	1.00	1.00
Q1		5.0	3.6	4.0	2.6
kB		0.4	0.3	0.5	0.5
Q2		0.7	0.4	0.4	0.2
Q Average		5.6	4.0	4.4	2.8
Q Spacing		25.0	25.0	25.0	25.0
Q Storage		0	0	0	0
Q S Ratio					
70th Percentile Output:					
fB%		1.2	1.2	1.2	1.2
BOQ		6.7	4.7	5.3	3.3
QSRatio					
85th Percentile Output:					
fB%		1.5	1.6	1.6	1.6
BOQ		8.7	6.2	6.9	4.4
QSRatio					
90th Percentile Output:					
fB%		1.7	1.7	1.7	1.7
BOQ		9.6	6.9	7.6	4.8
QSRatio					
95th Percentile Output:					
fB%		1.9	2.0	2.0	2.0
BOQ		10.9	7.9	8.7	5.6
QSRatio					
98th Percentile Output:					
fB%		2.3	2.4	2.4	2.5
BOQ		13.3	9.7	10.7	7.0
QSRatio					

Appendix I-2 **Existing With Project HCS Intersection Worksheets**

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-5 SB Ramps

Inter.: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	418	0	509					1043	238		1749	312
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	P				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	22.3	0.0				7.3	14.4	0.0	
Yellow	3.6					3.6	4.3		
All Red	1.5					1.5	1.5		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	658	1770	0.67	0.37	18.4	B		
LTR	692	1863	0.00	0.37	11.8	B	28.3	C
R	588	1583	0.91	0.37	36.5	D		
Westbound								
Northbound								
T	2266	5074	0.48	0.45	11.9	B	9.7	A
R	1583	1583	0.16	1.00	0.0+	A		
Southbound								
T	2266	5074	0.81	0.45	16.8	B	14.3	B
R	1583	1583	0.21	1.00	0.1	A		

Intersection Delay = 15.9 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Culver at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-5 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	418	0	509					1043	238		1749	312
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	110	0	134					274	63		460	82
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	440	0	536					1098	251		1841	328
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	P				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	22.3	0.0			7.3	14.4	0.0	
Yellow	3.6				3.6	4.3		
All Red	1.5				1.5	1.5		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	418	0	509					1043	238		1749	312
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	440	0	536					1098	251		1841	328
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	440	0	536					1098	251		1841	328
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound				Northbound			Southbound	
LG	L	LTR	R					T	R		T	R
So	1900	1900	1900					1900	1900		1900	1900
Lanes	1	1	1	0	0	0	0	3	1	0	3	1
fW	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980					0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fLU	1.000	1.000	1.000					0.908	1.000		0.908	1.000
fRT		1.000	0.850					1.000	0.850		1.000	0.850
fLT	0.950	1.000						1.000			1.000	
Sec.												
fLpb	1.000	1.000						1.000			1.000	
fRpb		1.000	1.000					1.000	1.000		1.000	1.000
S	1770	1863	1583					5074	1583		5074	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	440	1770		0.25	0.37	658	0.67
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.37	692	0.00
Right	R	536	1583	#	0.34	0.37	588	0.91
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1098	5074		0.22	0.45	2266	0.48
Right	R	251	1583		0.16	1.00	1583	0.16
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1841	5074	#	0.36	0.45	2266	0.81
Right	R	328	1583		0.21	1.00	1583	0.21

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.70
Total lost time per cycle, L = 10.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.86

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.67	0.37	15.8	1.000	658	0.24	2.6	0.0	18.4	B		
LTR	0.00	0.37	11.8	1.000	692	0.50	0.0	0.0	11.8	B	28.3	C
R	0.91	0.37	17.9	1.000	588	0.43	18.6	0.0	36.5	D		
Westbound												
Northbound												
T	0.48	0.45	11.7	1.000	2266	0.11	0.2	0.0	11.9	B	9.7	A
R	0.16	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Southbound												

T	0.81	0.45	14.4	1.000	2266	0.35	2.4	0.0	16.8	B	14.3	B
R	0.21	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 15.9 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	18.8	15.8	0.00	0.0	0.0	18.4

LTR	0.0	0.00	18.8	11.8	0.00	0.0	0.0	11.8
R	0.0	0.00	18.8	17.9	0.00	0.0	0.0	36.5
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	16.6	11.7	0.00	0.0	0.0	11.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Southbound								
	0.0						0.0	
T	0.0	0.00	16.6	14.4	0.00	0.0	0.0	16.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 15.9 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	440	0	536				403	251		675	328	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	3	1	0	3	1	
SL	1770	1863	1583				1862	1583		1862	1583	
LnCapacity	658	692	588				831	1583		831	1583	
Flow Ratio	0.2	0.0	0.3				0.2	0.2		0.4	0.2	
v/c Ratio	0.67	0.00	0.91				0.48	0.16		0.81	0.21	
Grn Ratio	0.37	0.37	0.37				0.45	1.00		0.45	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	6.1	0.0	8.5				4.7			9.8		
kB	0.4	0.7	0.4				0.5	0.7		0.5	0.7	
Q2	0.8	0.0	2.8				0.5	0.1		1.9	0.2	
Q Average	7.0	0.0	11.3				5.2			11.7		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.3	1.2				1.2			1.2		
BOQ	8.2	0.0	13.3				6.2			13.7		
QSRatio												
85th Percentile Output:												
fB%	1.5	1.7	1.5				1.6			1.5		
BOQ	10.7	0.0	17.0				8.1			17.6		
QSRatio												
90th Percentile Output:												
fB%	1.7	2.0	1.6				1.7			1.6		
BOQ	11.7	0.0	18.4				8.9			19.0		
QSRatio												
95th Percentile Output:												
fB%	1.9	2.6	1.8				1.9			1.8		
BOQ	13.3	0.0	20.6				10.1			21.2		
QSRatio												
98th Percentile Output:												
fB%	2.3	3.2	2.1				2.4			2.1		
BOQ	15.9	0.0	24.0				12.3			24.6		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-5 SB Ramps

Inter.: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	700	0	915					1772	300		1225	224
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	P				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	45.3	0.0				9.5	19.2	0.0	
Yellow	3.6					3.6	4.3		
All Red	1.5					1.5	1.5		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	891	1770	0.83	0.50	25.5	C		
LTR	938	1863	0.00	0.50	11.1	B	83.4	F
R	797	1583	1.21	0.50	127.7	F		
Westbound								
Northbound								
T	1906	5074	0.98	0.38	43.5	D	37.2	D
R	1583	1583	0.20	1.00	0.1	A		
Southbound								
T	1906	5074	0.68	0.38	24.5	C	20.7	C
R	1583	1583	0.15	1.00	0.0+	A		

Intersection Delay = 47.1 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Culver at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-5 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	700	0	915					1772	300		1225	224
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	184	0	241					466	79		322	59
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	737	0	963					1865	316		1289	236
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	P				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	45.3	0.0			9.5	19.2	0.0	
Yellow	3.6				3.6	4.3		
All Red	1.5				1.5	1.5		

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	700	0	915					1772	300		1225	224
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	737	0	963					1865	316		1289	236
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	737	0	963					1865	316		1289	236
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound				Northbound			Southbound	
LG	L	LTR	R					T	R		T	R
So	1900	1900	1900					1900	1900		1900	1900
Lanes	1	1	1	0	0	0	0	3	1	0	3	1
fW	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980					0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fLU	1.000	1.000	1.000					0.908	1.000		0.908	1.000
fRT		1.000	0.850					1.000	0.850		1.000	0.850
fLT	0.950	1.000						1.000			1.000	
Sec.												
fLpb	1.000	1.000						1.000			1.000	
fRpb		1.000	1.000					1.000	1.000		1.000	1.000
S	1770	1863	1583					5074	1583		5074	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	737	1770		0.42	0.50	891	0.83
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.50	938	0.00
Right	R	963	1583	#	0.61	0.50	797	1.21
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1865	5074	#	0.37	0.38	1906	0.98
Right	R	316	1583		0.20	1.00	1583	0.20
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1289	5074		0.25	0.38	1906	0.68
Right	R	236	1583		0.15	1.00	1583	0.15

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.98
Total lost time per cycle, L = 10.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.11

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.83	0.50	19.0	1.000	891	0.37	6.5	0.0	25.5	C		
LTR	0.00	0.50	11.1	1.000	938	0.50	0.0	0.0	11.1	B	83.4	F
R	1.21	0.50	22.4	1.000	797	0.50	105.4	0.0	127.7	F		
Westbound												
Northbound												
T	0.98	0.38	27.7	1.000	1906	0.48	15.8	0.0	43.5	D	37.2	D
R	0.20	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.68	0.38	23.5	1.000	1906	0.25	1.0	0.0	24.5	C	20.7	C
R	0.15	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		

Intersection delay = 47.1 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	90.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	90.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	90.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	22.4	19.0	0.00	0.0	0.0	25.5

LTR	0.0	0.00	22.4	11.1	0.00	0.0	0.0	11.1
R	0.0	0.00	22.4	22.4	0.00	41.5	0.0	127.7
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	28.1	27.7	0.00	0.0	0.0	43.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	28.1	23.5	0.00	0.0	0.0	24.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+

Intersection Delay 47.1 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	737	0	963				684	316		473	236	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	3	1	0	3	1	
SL	1770	1863	1583				1862	1583		1862	1583	
LnCapacity	891	938	797				699	1583		699	1583	
Flow Ratio	0.4	0.0	0.6				0.4	0.2		0.3	0.1	
v/c Ratio	0.83	0.00	1.21				0.98	0.20		0.68	0.15	
Grn Ratio	0.50	0.50	0.50				0.38	1.00		0.38	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	15.7	0.0	24.1				16.9			9.9		
kB	0.6	1.1	0.6				0.6	0.9		0.6	0.9	
Q2	2.7	0.0	23.8				6.0	0.2		1.1	0.2	
Q Average	18.4	0.0	47.9				22.9			11.0		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.3	1.1				1.2			1.2		
BOQ	21.4	0.0	54.1				26.5			13.0		
QSRatio												
85th Percentile Output:												
fB%	1.5	1.7	1.4				1.4			1.5		
BOQ	26.9	0.0	65.1				33.0			16.6		
QSRatio												
90th Percentile Output:												
fB%	1.6	2.0	1.4				1.5			1.6		
BOQ	28.7	0.0	68.8				35.0			18.0		
QSRatio												
95th Percentile Output:												
fB%	1.7	2.6	1.5				1.7			1.8		
BOQ	31.5	0.0	73.8				38.2			20.1		
QSRatio												
98th Percentile Output:												
fB%	1.9	3.2	1.7				1.9			2.1		
BOQ	35.7	0.0	82.6				42.9			23.5		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-5 NB Ramps

Inter.: Jamboree at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	0	3	1	0	3	1
LGConfig				L		LTR	R		T	R		T	R
Volume				879	0	454		1227	721		1806	474
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left	A				SB Left				
Thru	P				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	41.3	0.0				9.5	18.9	0.0	
Yellow	3.6					4.3	4.3		
All Red	1.0					1.0	1.0		

Cycle Length: 84.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	861	1770	1.07	0.49	74.4	E		
LTR	906	1863	0.00	0.49	11.2	B	55.1	E
R	770	1583	0.62	0.49	17.6	B		
Northbound								
T	2014	5074	0.64	0.40	21.4	C	13.6	B
R	1583	1583	0.48	1.00	0.2	A		
Southbound								
T	2014	5074	0.94	0.40	34.6	C	27.4	C
R	1583	1583	0.32	1.00	0.1	A		

Intersection Delay = 29.2 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Jamboree at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-5 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				879	0	454		1227	721		1806	474
% Heavy Veh				2	2	2		2	2		2	2
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
PK 15 Vol				231	0	119		323	190		475	125
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1	0	3	1	0	3	1
LGConfig				L		LTR	R		T	R		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0		12.0	12.0
RTOR Vol						0				0			0
Adj Flow				925	0	478		1292	759		1901	499
%InSharedLn				0		0							
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0		0.0	0.0
Arriv. Type				3	3	3		3	3		3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		P			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		41.3	0.0			9.5	18.9	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 84.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				879	0	454		1227	721		1806	474
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
Adj flow				925	0	478		1292	759		1901	499
No. Lanes	0	0	0		1	1	1	0	3	1	0	3	1
Lane group				L		LTR	R		T	R		T	R
Adj flow				925	0	478		1292	759		1901	499
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L	LTR	R		T	R		T	R	
So			1900	1900	1900		1900	1900		1900	1900	
Lanes	0	0	1	1	1	0	3	1	0	3	1	
fW			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fHV			0.980	0.980	0.980		0.980	0.980		0.980	0.980	
fG			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fP			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fBB			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fA			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fLU			1.000	1.000	1.000		0.908	1.000		0.908	1.000	
fRT				1.000	0.850		1.000	0.850		1.000	0.850	
fLT			0.950	1.000			1.000			1.000		
Sec.												
fLpb			1.000	1.000			1.000			1.000		
fRpb				1.000	1.000		1.000	1.000		1.000	1.000	
S			1770	1863	1583		5074	1583		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	925	1770	#	0.52	0.49	861	1.07
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.49	906	0.00
Right	R	478	1583		0.30	0.49	770	0.62
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1292	5074		0.25	0.40	2014	0.64
Right	R	759	1583		0.48	1.00	1583	0.48
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1901	5074	#	0.37	0.40	2014	0.94
Right	R	499	1583		0.32	1.00	1583	0.32

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.90
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.02

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.07	0.49	21.8	1.000	861	0.50	52.6	0.0	74.4	E		
LTR	0.00	0.49	11.2	1.000	906	0.50	0.0	0.0	11.2	B	55.1	E
R	0.62	0.49	16.0	1.000	770	0.20	1.5	0.0	17.6	B		
Northbound												
T	0.64	0.40	20.7	1.000	2014	0.22	0.7	0.0	21.4	C	13.6	B
R	0.48	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.94	0.40	24.7	1.000	2014	0.46	9.9	0.0	34.6	C	27.4	C
R	0.32	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 29.2 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	84.9 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	84.9 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	84.9 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	21.8	21.8	0.00	16.0	0.0	74.4
LTR	0.0	0.00	21.8	11.2	0.00	0.0	0.0	11.2
R	0.0	0.00	21.8	16.0	0.00	0.0	0.0	17.6
Northbound								
	0.0						0.0	
T	0.0	0.00	25.6	20.7	0.00	0.0	0.0	21.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	25.6	24.7	0.00	0.0	0.0	34.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 29.2 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	LTR	R	T	R		T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate				925	0	478	474	759		697	499	
So				1900	1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0	1	1	1	0 3	1	0	3	1	
SL				1770	1863	1583	1862	1583		1862	1583	
LnCapacity				861	906	770	739	1583		739	1583	
Flow Ratio				0.5	0.0	0.3	0.3	0.5		0.4	0.3	
v/c Ratio				1.07	0.00	0.62	0.64	0.48		0.94	0.32	
Grn Ratio				0.49	0.49	0.49	0.40	1.00		0.40	1.00	
I Factor					1.000		1.000			1.000		
AT or PVG				3	3	3	3	3		3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
PF2				1.00	1.00	1.00	1.00			1.00		
Q1				21.8	0.0	8.3	9.0			15.8		
kB				0.6	1.0	0.6	0.6	0.9		0.6	0.9	
Q2				13.3	0.0	0.9	1.0	0.8		4.8	0.4	
Q Average				35.1	0.0	9.2	10.0			20.7		
Q Spacing				25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage				0	0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.1	1.3	1.2	1.2			1.2		
BOQ				40.1	0.0	10.9	11.8			24.0		
QSRatio												
85th Percentile Output:												
fB%				1.4	1.7	1.5	1.5			1.5		
BOQ				48.9	0.0	14.0	15.2			30.0		
QSRatio												
90th Percentile Output:												
fB%				1.5	2.0	1.7	1.6			1.5		
BOQ				51.6	0.0	15.2	16.4			31.9		
QSRatio												
95th Percentile Output:												
fB%				1.6	2.6	1.9	1.8			1.7		
BOQ				55.7	0.0	17.1	18.5			34.9		
QSRatio												
98th Percentile Output:												
fB%				1.8	3.2	2.2	2.2			1.9		
BOQ				62.0	0.0	20.2	21.7			39.3		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-5 NB Ramps

Inter.: Jamboree at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	0	3	1	0	3	1
LGConfig				L		LTR	R		T	R		T	R
Volume				311	0	897		2654	634		1490	480
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru	P				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	45.0	0.0				19.1	40.7	0.0
Yellow	3.6					4.3	4.3	
All Red	1.0					1.0	1.0	

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	664	1770	0.49	0.38	29.3	C		
LTR	699	1863	0.00	0.38	23.4	C	238.2	F
R	594	1583	1.59	0.38	310.6	F		
Northbound								
T	2753	5074	1.01	0.54	48.4	D	39.1	D
R	1583	1583	0.42	1.00	0.2	A		
Southbound								
T	2753	5074	0.57	0.54	18.5	B	14.0	B
R	1583	1583	0.32	1.00	0.1	A		

Intersection Delay = 68.6 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Jamboree at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-5 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				311	0	897		2654	634		1490	480
% Heavy Veh				2	2	2		2	2		2	2
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
PK 15 Vol				82	0	236		698	167		392	126
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1	0	3	1	0	3	1
LGConfig				L		LTR	R		T	R		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0		12.0	12.0
RTOR Vol						0				0			0
Adj Flow				327	0	944		2794	667		1568	505
%InSharedLn				0		0						
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0		0.0	0.0
Arriv. Type				3	3	3		3	3		3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		P			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		45.0	0.0			19.1	40.7	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				311	0	897		2654	634		1490	480
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
Adj flow				327	0	944		2794	667		1568	505
No. Lanes	0	0	0		1	1	1	0	3	1	0	3	1
Lane group				L		LTR	R		T	R		T	R
Adj flow				327	0	944		2794	667		1568	505
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L	LTR	R		T	R		T	R	
So			1900	1900	1900		1900	1900		1900	1900	
Lanes	0	0	1	1	1	0	3	1	0	3	1	
fW			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fHV			0.980	0.980	0.980		0.980	0.980		0.980	0.980	
fG			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fP			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fBB			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fA			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fLU			1.000	1.000	1.000		0.908	1.000		0.908	1.000	
fRT				1.000	0.850		1.000	0.850		1.000	0.850	
fLT			0.950	1.000			1.000			1.000		
Sec.												
fLpb			1.000	1.000			1.000			1.000		
fRpb				1.000	1.000		1.000	1.000		1.000	1.000	
S			1770	1863	1583		5074	1583		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	327	1770		0.18	0.38	664	0.49
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.38	699	0.00
Right	R	944	1583	#	0.60	0.38	594	1.59
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2794	5074	#	0.55	0.54	2753	1.01
Right	R	667	1583		0.42	1.00	1583	0.42
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1568	5074		0.31	0.54	2753	0.57
Right	R	505	1583		0.32	1.00	1583	0.32

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.15
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.25

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.49	0.38	28.7	1.000	664	0.11	0.6	0.0	29.3	C		
LTR	0.00	0.38	23.4	1.000	699	0.50	0.0	0.0	23.4	C	238.2	F
R	1.59	0.38	37.5	1.000	594	0.50	273.1	0.0	310.6	F		
Northbound												
T	1.01	0.54	27.5	1.000	2753	0.50	21.0	0.0	48.4	D	39.1	D
R	0.42	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.57	0.54	18.2	1.000	2753	0.16	0.3	0.0	18.5	B	14.0	B
R	0.32	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 68.6 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	120.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	120.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	120.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	37.5	28.7	0.00	0.0	0.0	29.3
LTR	0.0	0.00	37.5	23.4	0.00	0.0	0.0	23.4
R	0.0	0.00	37.5	37.5	0.00	87.5	0.0	310.6
Northbound								
	0.0						0.0	
T	0.0	0.00	27.5	27.5	0.00	10.2	0.0	48.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	27.5	18.2	0.00	0.0	0.0	18.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 68.6 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup				L	LTR	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				327	0	944	1025	667	575	505
So				1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	1	1	1	3	1	3	1
SL				1770	1863	1583	1862	1583	1862	1583
LnCapacity				664	699	594	1010	1583	1010	1583
Flow Ratio				0.2	0.0	0.6	0.6	0.4	0.3	0.3
v/c Ratio				0.49	0.00	1.59	1.01	0.42	0.57	0.32
Grn Ratio				0.38	0.38	0.38	0.54	1.00	0.54	1.00
I Factor					1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00	1.00		1.00	
Q1				8.4	0.0	31.5	34.2		12.7	
kB				0.6	1.1	0.6	0.8	1.1	0.8	1.1
Q2				0.6	0.0	45.3	11.3	0.8	1.1	0.5
Q Average				9.0	0.0	76.8	45.4		13.8	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%				1.2	1.3	1.1	1.1		1.2	
BOQ				10.6	0.0	85.6	51.4		16.1	
QSRatio										
85th Percentile Output:										
fB%				1.5	1.7	1.3	1.4		1.5	
BOQ				13.7	0.0	102	62.1		20.5	
QSRatio										
90th Percentile Output:										
fB%				1.7	2.0	1.4	1.4		1.6	
BOQ				14.8	0.0	108	65.5		22.0	
QSRatio										
95th Percentile Output:										
fB%				1.9	2.6	1.5	1.5		1.8	
BOQ				16.7	0.0	116	70.3		24.5	
QSRatio										
98th Percentile Output:										
fB%				2.2	3.2	1.7	1.7		2.0	
BOQ				19.7	0.0	131	78.6		28.2	
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-5 SB Ramps

Inter.: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	441	0	1048					1514	386		2027	512
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	P				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	53.3	0.0				32.1	9.4	0.0	
Yellow	3.6					4.3	4.3		
All Red	1.0					1.0	1.0		

Cycle Length: 110.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	858	1770	0.54	0.48	20.5	C		
LTR	903	1863	0.00	0.48	14.6	B	170.0	F
R	767	1583	1.44	0.48	232.9	F		
Westbound								
Northbound								
T	2159	5074	0.74	0.43	27.8	C	22.2	C
R	1583	1583	0.26	1.00	0.1	A		
Southbound								
T	2159	5074	0.99	0.43	48.0	D	38.3	D
R	1583	1583	0.34	1.00	0.1	A		

Intersection Delay = 66.2 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Jamboree at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-5 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	441	0	1048					1514	386		2027	512
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	116	0	276					398	102		533	135
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	464	0	1103					1594	406		2134	539
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	P				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	53.3	0.0			32.1	9.4	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 110.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	441	0	1048					1514	386		2027	512
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	464	0	1103					1594	406		2134	539
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR R					T	R		T	R
Adj flow	464	0	1103					1594	406		2134	539
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound							Northbound							Southbound						
LG	L		LTR	R											T	R						T	R				
So	1900		1900	1900											1900	1900						1900	1900				
Lanes	1		1		0		0		0						3	1		0				3	1				
fW	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fHV	0.980		0.980	0.980											0.980	0.980						0.980	0.980				
fG	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fP	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fBB	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fA	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fLU	1.000		1.000	1.000											0.908	1.000						0.908	1.000				
fRT			1.000	0.850											1.000	0.850						1.000	0.850				
fLT	0.950		1.000												1.000							1.000					
Sec.																											
fLpb	1.000		1.000												1.000							1.000					
fRpb			1.000	1.000											1.000	1.000						1.000	1.000				
S	1770		1863	1583											5074	1583						5074	1583				
Sec.																											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	464	1770		0.26	0.48	858	0.54
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.48	903	0.00
Right	R	1103	1583	#	0.70	0.48	767	1.44
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1594	5074		0.31	0.43	2159	0.74
Right	R	406	1583		0.26	1.00	1583	0.26
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2134	5074	#	0.42	0.43	2159	0.99
Right	R	539	1583		0.34	1.00	1583	0.34

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.12
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.23

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.54	0.48	19.8	1.000	858	0.14	0.7	0.0	20.5	C		
LTR	0.00	0.48	14.6	1.000	903	0.50	0.0	0.0	14.6	B	170.0	F
R	1.44	0.48	28.4	1.000	767	0.50	204.6	0.0	232.9	F		
Westbound												
Northbound												
T	0.74	0.43	26.5	1.000	2159	0.30	1.4	0.0	27.8	C	22.2	C
R	0.26	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.99	0.43	31.3	1.000	2159	0.49	16.7	0.0	48.0	D	38.3	D
R	0.34	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 66.2 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 110.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 110.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	110.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	28.4	19.8	0.00	0.0	0.0	20.5

LTR	0.0	0.00	28.4	14.6	0.00	0.0	0.0	14.6
R	0.0	0.00	28.4	28.4	0.00	84.0	0.0	232.9
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	31.6	26.5	0.00	0.0	0.0	27.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	31.6	31.3	0.00	0.0	0.0	48.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 66.2 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	464	0	1103				585	406		783	539	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	3	1	0	3	1	
SL	1770	1863	1583				1862	1583		1862	1583	
LnCapacity	858	903	767				792	1583		792	1583	
Flow Ratio	0.3	0.0	0.7				0.3	0.3		0.4	0.3	
v/c Ratio	0.54	0.00	1.44				0.74	0.26		0.99	0.34	
Grn Ratio	0.48	0.48	0.48				0.43	1.00		0.43	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	9.9	0.0	33.7				15.0			23.7		
kB	0.7	1.2	0.7				0.7	1.0		0.7	1.0	
Q2	0.8	0.0	44.1				1.8	0.4		7.6	0.5	
Q Average	10.7	0.0	77.8				16.8			31.3		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.3	1.1				1.2			1.1		
BOQ	12.6	0.0	86.7				19.5			35.9		
QSRatio												
85th Percentile Output:												
fB%	1.5	1.7	1.3				1.5			1.4		
BOQ	16.2	0.0	103				24.7			44.0		
QSRatio												
90th Percentile Output:												
fB%	1.6	2.0	1.4				1.6			1.5		
BOQ	17.5	0.0	110				26.4			46.5		
QSRatio												
95th Percentile Output:												
fB%	1.8	2.6	1.5				1.7			1.6		
BOQ	19.6	0.0	117				29.1			50.3		
QSRatio												
98th Percentile Output:												
fB%	2.1	3.2	1.7				2.0			1.8		
BOQ	22.9	0.0	132				33.1			56.1		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-5 SB Ramps

Inter.: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L	LTR	R					T	R		T	R
Volume	684	0	757					2560	915		1370	434
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	P				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	45.3	0.0				34.4	20.1	0.0	
Yellow	3.6					4.3	4.3		
All Red	1.0					1.0	1.0		

Cycle Length: 115.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	697	1770	1.03	0.39	77.7	E		
LTR	734	1863	0.00	0.39	21.1	C	127.1	F
R	624	1583	1.28	0.39	171.7	F		
Westbound								
Northbound								
T	2638	5074	1.02	0.52	50.8	D	37.6	D
R	1583	1583	0.61	1.00	0.7	A		
Southbound								
T	2638	5074	0.55	0.52	18.7	B	14.3	B
R	1583	1583	0.29	1.00	0.1	A		

Intersection Delay = 50.5 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Jamboree at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-5 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	684	0	757					2560	915		1370	434
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	180	0	199					674	241		361	114
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	720	0	797					2695	963		1442	457
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	P				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	45.3	0.0			34.4	20.1	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 115.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	684	0	757					2560	915		1370	434
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	720	0	797					2695	963		1442	457
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	720	0	797					2695	963		1442	457
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound							Northbound							Southbound						
LG	L		LTR	R											T	R						T	R				
So	1900		1900	1900											1900	1900						1900	1900				
Lanes	1		1		0		0		0		0				3	1		0				3	1				
fW	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fHV	0.980		0.980	0.980											0.980	0.980						0.980	0.980				
fG	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fP	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fBB	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fA	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fLU	1.000		1.000	1.000											0.908	1.000						0.908	1.000				
fRT			1.000	0.850											1.000	0.850						1.000	0.850				
fLT	0.950		1.000												1.000							1.000					
Sec.																											
fLpb	1.000		1.000												1.000							1.000					
fRpb			1.000	1.000											1.000	1.000						1.000	1.000				
S	1770		1863	1583											5074	1583						5074	1583				
Sec.																											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	720	1770		0.41	0.39	697	1.03
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.39	734	0.00
Right	R	797	1583	#	0.50	0.39	624	1.28
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2695	5074	#	0.53	0.52	2638	1.02
Right	R	963	1583		0.61	1.00	1583	0.61
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1442	5074		0.28	0.52	2638	0.55
Right	R	457	1583		0.29	1.00	1583	0.29

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.03
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.13

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.03	0.39	34.9	1.000	697	0.50	42.9	0.0	77.7	E		
LTR	0.00	0.39	21.1	1.000	734	0.50	0.0	0.0	21.1	C	127.1	F
R	1.28	0.39	34.9	1.000	624	0.50	136.9	0.0	171.7	F		
Westbound												
Northbound												
T	1.02	0.52	27.6	1.000	2638	0.50	23.2	0.0	50.8	D	37.6	D
R	0.61	1.00	0.0	0.950	1583	0.19	0.7	0.0	0.7	A		
Southbound												

T	0.55	0.52	18.5	1.000	2638	0.15	0.2	0.0	18.7	B	14.3	B
R	0.29	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 50.5 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	115.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	115.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	115.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	34.9	34.9	0.00	5.7	0.0	77.7

LTR	0.0	0.00	34.9	21.1	0.00	0.0	0.0	21.1
R	0.0	0.00	34.9	34.9	0.00	43.3	0.0	171.7
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	27.6	27.6	0.00	14.3	0.0	50.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.7
Southbound								
	0.0						0.0	
T	0.0	0.00	27.6	18.5	0.00	0.0	0.0	18.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 50.5 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	720	0	797				989	963		529	457	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	3	1	0	3	1	
SL	1770	1863	1583				1862	1583		1862	1583	
LnCapacity	697	734	624				968	1583		968	1583	
Flow Ratio	0.4	0.0	0.5				0.5	0.6		0.3	0.3	
v/c Ratio	1.03	0.00	1.28				1.02	0.61		0.55	0.29	
Grn Ratio	0.39	0.39	0.39				0.52	1.00		0.52	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	23.0	0.0	25.5				31.6			11.3		
kB	0.6	1.1	0.6				0.8	1.1		0.8	1.1	
Q2	9.2	0.0	24.1				11.2	1.6		0.9	0.4	
Q Average	32.2	0.0	49.6				42.8			12.3		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.3	1.1				1.1			1.2		
BOQ	36.8	0.0	56.0				48.6			14.4		
QSRatio												
85th Percentile Output:												
fB%	1.4	1.7	1.4				1.4			1.5		
BOQ	45.1	0.0	67.3				58.8			18.4		
QSRatio												
90th Percentile Output:												
fB%	1.5	2.0	1.4				1.4			1.6		
BOQ	47.6	0.0	71.1				62.0			19.8		
QSRatio												
95th Percentile Output:												
fB%	1.6	2.6	1.5				1.6			1.8		
BOQ	51.5	0.0	76.3				66.6			22.1		
QSRatio												
98th Percentile Output:												
fB%	1.8	3.2	1.7				1.7			2.1		
BOQ	57.4	0.0	85.4				74.4			25.6		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-5 NB Ramps

Inter.: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	105	0	137				313	953			1828	66
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	P				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right	A				WB Right			
Green	7.7	0.0				8.6	4.9	17.9 0.0
Yellow	3.6					3.2	4.3	4.3
All Red	1.5					1.0	1.5	1.5

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	227	1770	0.49	0.13	26.0	C		
LTR	239	1863	0.00	0.13	22.8	C	31.6	C
R	203	1583	0.71	0.13	36.0	D		
Westbound								
Northbound								
L	493	3437	0.67	0.14	27.8	C		
T	3501	5074	0.29	0.69	3.6	A	9.6	A
Southbound								
T	2419	5074	0.80	0.48	15.2	B	14.6	B
R	1583	1583	0.04	1.00	0.0+	A		

Intersection Delay = 14.0 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Tustin Ranch at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-5 NB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	105	0	137				313	953			1828	66
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	28	0	36				82	251			481	17
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	111	0	144				329	1003			1924	69
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		P			Thru	A	A	A
Right		A			Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right		A			WB Right			
Green		7.7	0.0			8.6	4.9	17.9	0.0
Yellow		3.6				3.2	4.3	4.3	
All Red		1.5				1.0	1.5	1.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	105	0	137				313	953			1828	66
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	111	0	144				329	1003			1924	69
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	111	0	144				329	1003			1924	69
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	111	1770		0.06	0.13	227	0.49
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.13	239	0.00
Right	R	144	1583	#	0.09	0.13	203	0.71
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	329	3437	#	0.10	0.14	493	0.67
Prot								
Perm								
Thru	T	1003	5074		0.20	0.69	3501	0.29
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1924	5074	#	0.38	0.48	2419	0.80
Right	R	69	1583		0.04	1.00	1583	0.04

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.57
Total lost time per cycle, L = 15.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.76

Control Delay and LOS Determination_____

Appr/ Lane	Ratios		Unf Del	Prog Adj	Lane Grp	Incremental Factor	Del	Res Del	Lane Group		Approach	
Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
L	0.49	0.13	24.3	1.000	227	0.11	1.7	0.0	26.0	C		
LTR	0.00	0.13	22.8	1.000	239	0.50	0.0	0.0	22.8	C	31.6	C
R	0.71	0.13	25.1	1.000	203	0.27	10.9	0.0	36.0	D		
Westbound												
Northbound												
L	0.67	0.14	24.3	1.000	493	0.24	3.4	0.0	27.8	C		
T	0.29	0.69	3.6	1.000	3501	0.11	0.0	0.0	3.6	A	9.6	A
Southbound												

T	0.80	0.48	13.2	1.000	2419	0.34	1.9	0.0	15.2	B	14.6	B
R	0.04	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		

Intersection delay = 14.0 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	26.1	24.3	0.00	0.0	0.0	26.0

LTR	0.0	0.00	26.1	22.8	0.00	0.0	0.0	22.8
R	0.0	0.00	26.1	25.1	0.00	0.0	0.0	36.0
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	25.7	24.3	0.00	0.0	0.0	27.8
T	0.0	0.00	9.3	3.6	0.00	0.0	0.0	3.6
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	15.7	13.2	0.00	0.0	0.0	15.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+

Intersection Delay 14.0 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	111	0	144				169	368		706	69	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	0	3	1
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	227	239	203				253	1285		888	1583	
Flow Ratio	0.1	0.0	0.1				0.1	0.2		0.4	0.0	
v/c Ratio	0.49	0.00	0.71				0.67	0.29		0.80	0.04	
Grn Ratio	0.13	0.13	0.13				0.14	0.69		0.48	1.00	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00		
Q1	1.7	0.0	2.3				2.7	2.4		9.9		
kB	0.2	0.3	0.2				0.2	0.6		0.5	0.7	
Q2	0.2	0.0	0.5				0.5	0.3		1.8	0.0	
Q Average	1.9	0.0	2.8				3.1	2.6		11.7		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.3	1.2				1.2	1.2		1.2		
BOQ	2.3	0.0	3.3				3.7	3.1		13.8		
QSRatio												
85th Percentile Output:												
fB%	1.6	1.7	1.6				1.6	1.6		1.5		
BOQ	3.1	0.0	4.4				4.9	4.1		17.6		
QSRatio												
90th Percentile Output:												
fB%	1.8	2.0	1.7				1.7	1.8		1.6		
BOQ	3.4	0.0	4.9				5.4	4.6		19.0		
QSRatio												
95th Percentile Output:												
fB%	2.0	2.6	2.0				2.0	2.0		1.8		
BOQ	3.9	0.0	5.6				6.3	5.3		21.3		
QSRatio												
98th Percentile Output:												
fB%	2.6	3.2	2.5				2.5	2.5		2.1		
BOQ	4.9	0.0	7.0				7.8	6.6		24.7		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-5 NB Ramps

Inter.: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	274	0	199				621	1198			698	496
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	P				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right	A				WB Right				
Green	13.6	0.0				16.8	4.4	4.3	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	401	1770	0.72	0.23	27.5	C		
LTR	422	1863	0.00	0.23	17.9	B	25.7	C
R	359	1583	0.58	0.23	23.1	C		
Westbound								
Northbound								
L	962	3437	0.68	0.28	21.2	C		
T	3002	5074	0.42	0.59	6.8	A	11.7	B
Southbound								
T	1226	5074	0.60	0.24	21.0	C	12.3	B
R	1583	1583	0.33	1.00	0.1	A		

Intersection Delay = 13.8 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Tustin Ranch at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-5 NB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	274	0	199				621	1198			698	496
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	72	0	52				163	315			184	131
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	288	0	209				654	1261			735	522
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A							
EB Thru	P							
EB Right	A							
EB Peds								
WB Left								
WB Thru								
WB Right								
WB Peds								
NB Left					A			
NB Thru					A	A	A	
NB Right								
NB Peds								
SB Left								
SB Thru						A	A	
SB Right					A	A	A	
SB Peds								
NB Right								
SB Right	A							
EB Right								
WB Right								
Green	13.6	0.0			16.8	4.4	4.3	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	1.5				1.0	1.5	1.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	274	0	199				621	1198			698	496
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	288	0	209				654	1261			735	522
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	288	0	209				654	1261			735	522
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	288	1770	#	0.16	0.23	401	0.72
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.23	422	0.00
Right	R	209	1583		0.13	0.23	359	0.58
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	654	3437	#	0.19	0.28	962	0.68
Prot								
Perm								
Thru	T	1261	5074		0.25	0.59	3002	0.42
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	735	5074	#	0.14	0.24	1226	0.60
Right	R	522	1583		0.33	1.00	1583	0.33

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.50
Total lost time per cycle, L = 15.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.67

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.72	0.23	21.4	1.000	401	0.28	6.1	0.0	27.5	C		
LTR	0.00	0.23	17.9	1.000	422	0.50	0.0	0.0	17.9	B	25.7	C
R	0.58	0.23	20.7	1.000	359	0.17	2.4	0.0	23.1	C		
Westbound												
Northbound												
L	0.68	0.28	19.2	1.000	962	0.25	2.0	0.0	21.2	C		
T	0.42	0.59	6.7	1.000	3002	0.11	0.1	0.0	6.8	A	11.7	B
Southbound												

T	0.60	0.24	20.2	1.000	1226	0.19	0.8	0.0	21.0	C	12.3	B
R	0.33	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 13.8 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					

EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

L	0.0	0.00	23.2	21.4	0.00	0.0	0.0	27.5
LTR	0.0	0.00	23.2	17.9	0.00	0.0	0.0	17.9
R	0.0	0.00	23.2	20.7	0.00	0.0	0.0	23.1
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	21.6	19.2	0.00	0.0	0.0	21.2
T	0.0	0.00	12.3	6.7	0.00	0.0	0.0	6.8
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	22.8	20.2	0.00	0.0	0.0	21.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 13.8 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	288	0	209				336	462		269	522	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	401	422	359				495	1102		450	1583	
Flow Ratio	0.2	0.0	0.1				0.2	0.2		0.1	0.3	
v/c Ratio	0.72	0.00	0.58				0.68	0.42		0.60	0.33	
Grn Ratio	0.23	0.23	0.23				0.28	0.59		0.24	1.00	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00		
Q1	4.4	0.0	3.1				5.0	4.2		4.0		
kB	0.3	0.5	0.3				0.4	0.6		0.3	0.7	
Q2	0.8	0.0	0.4				0.7	0.4		0.5	0.3	
Q Average	5.2	0.0	3.5				5.7	4.6		4.5		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.3	1.2				1.2	1.2		1.2		
BOQ	6.2	0.0	4.2				6.8	5.5		5.3		
QSRatio												
85th Percentile Output:												
fB%	1.6	1.7	1.6				1.5	1.6		1.6		
BOQ	8.1	0.0	5.5				8.8	7.2		7.0		
QSRatio												
90th Percentile Output:												
fB%	1.7	2.0	1.7				1.7	1.7		1.7		
BOQ	8.9	0.0	6.1				9.7	7.9		7.7		
QSRatio												
95th Percentile Output:												
fB%	1.9	2.6	2.0				1.9	2.0		2.0		
BOQ	10.1	0.0	7.0				11.0	9.0		8.8		
QSRatio												
98th Percentile Output:												
fB%	2.4	3.2	2.5				2.3	2.4		2.4		
BOQ	12.3	0.0	8.6				13.4	11.0		10.7		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-5 SB Ramps

Inter.: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	886	0	687				130	764			1429	542
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	P				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	54.6	0.0				5.3	23.1	9.6	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 110.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	879	1770	1.06	0.50	75.7	E		
LTR	925	1863	0.00	0.50	14.0	B	60.8	E
R	786	1583	0.92	0.50	41.6	D		
Westbound								
Northbound								
L	166	3437	0.83	0.05	79.5	E		
T	2145	5074	0.37	0.42	21.9	C	30.3	C
Southbound								
T	1730	5074	0.87	0.34	39.0	D	53.3	D
R	540	1583	1.06	0.34	91.0	F		

Intersection Delay = 51.3 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Tustin Ranch at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-5 SB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	886	0	687				130	764			1429	542
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	233	0	181				34	201			376	143
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	933	0	723				137	804			1504	571
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	P				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	54.6	0.0				5.3	23.1	9.6	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 110.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	886	0	687				130	764			1429	542
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	933	0	723				137	804			1504	571
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	933	0	723				137	804			1504	571
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	933	1770	#	0.53	0.50	879	1.06
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.50	925	0.00
Right	R	723	1583		0.46	0.50	786	0.92
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	137	3437	#	0.04	0.05	166	0.83
Prot								
Perm								
Thru	T	804	5074		0.16	0.42	2145	0.37
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1504	5074		0.30	0.34	1730	0.87
Right	R	571	1583	#	0.36	0.34	540	1.06

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.93
Total lost time per cycle, L = 12.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.05

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.06	0.50	27.7	1.000	879	0.50	48.0	0.0	75.7	E		
LTR	0.00	0.50	14.0	1.000	925	0.50	0.0	0.0	14.0	B	60.8	E
R	0.92	0.50	25.7	1.000	786	0.44	15.9	0.0	41.6	D		
Westbound												
Northbound												
L	0.83	0.05	51.9	1.000	166	0.36	27.6	0.0	79.5	E		
T	0.37	0.42	21.8	1.000	2145	0.11	0.1	0.0	21.9	C	30.3	C
Southbound												

T	0.87	0.34	34.0	1.000	1730	0.40	5.1	0.0	39.0	D	53.3	D
R	1.06	0.34	36.3	1.000	540	0.50	54.8	0.0	91.0	F		

Intersection delay = 51.3 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	110.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	110.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	110.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	27.7	27.7	0.00	13.5	0.0	75.7

LTR	0.0	0.00	27.7	14.0	0.00	0.0	0.0	14.0
R	0.0	0.00	27.7	25.7	0.00	0.0	0.0	41.6
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	52.3	51.9	0.00	0.0	0.0	79.5
T	0.0	0.00	31.8	21.8	0.00	0.0	0.0	21.9
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	36.3	34.0	0.00	0.0	0.0	39.0
R	0.0	0.00	36.3	36.3	0.00	7.7	0.0	91.0

Intersection Delay 51.3 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	933	0	723				70	295		552	571	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	0 3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	879	925	786				85	787		635	540	
Flow Ratio	0.5	0.0	0.5				0.0	0.2		0.3	0.4	
v/c Ratio	1.06	0.00	0.92				0.82	0.37		0.87	1.06	
Grn Ratio	0.50	0.50	0.50				0.05	0.42		0.34	0.34	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
Q1	28.5	0.0	20.5				2.1	6.2		15.8	17.4	
kB	0.7	1.2	0.7				0.2	0.7		0.6	0.5	
Q2	13.1	0.0	4.8				0.6	0.4		3.0	8.4	
Q Average	41.6	0.0	25.3				2.7	6.6		18.8	25.9	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.3	1.2				1.2	1.2		1.2	1.2	
BOQ	47.3	0.0	29.1				3.3	7.8		21.9	29.8	
QSRatio												
85th Percentile Output:												
fB%	1.4	1.7	1.4				1.6	1.5		1.5	1.4	
BOQ	57.3	0.0	36.1				4.3	10.1		27.5	36.9	
QSRatio												
90th Percentile Output:												
fB%	1.4	2.0	1.5				1.7	1.7		1.6	1.5	
BOQ	60.4	0.0	38.2				4.8	11.1		29.3	39.1	
QSRatio												
95th Percentile Output:												
fB%	1.6	2.6	1.6				2.0	1.9		1.7	1.6	
BOQ	64.9	0.0	41.6				5.5	12.6		32.2	42.5	
QSRatio												
98th Percentile Output:												
fB%	1.7	3.2	1.8				2.5	2.3		1.9	1.8	
BOQ	72.5	0.0	46.6				6.9	15.2		36.5	47.5	
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-5 SB Ramps

Inter.: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	764	0	344				103	1083			623	280
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	P				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	31.8	0.0				5.3	5.3	5.2	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	866	1770	0.93	0.49	31.5	C		
LTR	911	1863	0.00	0.49	8.5	A	25.3	C
R	774	1583	0.47	0.49	11.4	B		
Westbound								
Northbound								
L	280	3437	0.39	0.08	29.2	C		
T	1897	5074	0.60	0.37	17.0	B	18.0	B
Southbound								
T	1194	5074	0.55	0.24	22.4	C	26.1	C
R	373	1583	0.79	0.24	34.4	C		

Intersection Delay = 22.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Tustin Ranch at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-5 SB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	764	0	344				103	1083			623	280
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	201	0	91				27	285			164	74
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	804	0	362				108	1140			656	295
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	P				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	31.8	0.0				5.3	5.3	5.2	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	764	0	344				103	1083			623	280
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	804	0	362				108	1140			656	295
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	804	0	362				108	1140			656	295
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	804	1770	#	0.45	0.49	866	0.93
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.49	911	0.00
Right	R	362	1583		0.23	0.49	774	0.47
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	108	3437		0.03	0.08	280	0.39
Prot								
Perm								
Thru	T	1140	5074	#	0.22	0.37	1897	0.60
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	656	5074		0.13	0.24	1194	0.55
Right	R	295	1583		0.19	0.24	373	0.79

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.68
Total lost time per cycle, L = 8.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.79

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.93	0.49	15.5	1.000	866	0.44	16.0	0.0	31.5	C		
LTR	0.00	0.49	8.5	1.000	911	0.50	0.0	0.0	8.5	A	25.3	C
R	0.47	0.49	11.0	1.000	774	0.11	0.4	0.0	11.4	B		
Westbound												
Northbound												
L	0.39	0.08	28.3	1.000	280	0.11	0.9	0.0	29.2	C		
T	0.60	0.37	16.4	1.000	1897	0.19	0.5	0.0	17.0	B	18.0	B
Southbound												

T	0.55	0.24	21.8	1.000	1194	0.15	0.5	0.0	22.4	C	26.1	C
R	0.79	0.24	23.3	1.000	373	0.34	11.0	0.0	34.4	C		

Intersection delay = 22.8 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	65.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	65.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	16.6	15.5	0.00	0.0	0.0	31.5

LTR	0.0	0.00	16.6	8.5	0.00	0.0	0.0	8.5
R	0.0	0.00	16.6	11.0	0.00	0.0	0.0	11.4
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	29.9	28.3	0.00	0.0	0.0	29.2
T	0.0	0.00	20.4	16.4	0.00	0.0	0.0	17.0
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	24.9	21.8	0.00	0.0	0.0	22.4
R	0.0	0.00	24.9	23.3	0.00	0.0	0.0	34.4

Intersection Delay 22.8 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	804	0	362				55	418		240	295	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	0	3	1
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	866	911	774				144	696		438	373	
Flow Ratio	0.5	0.0	0.2				0.0	0.2		0.1	0.2	
v/c Ratio	0.93	0.00	0.47				0.38	0.60		0.55	0.79	
Grn Ratio	0.49	0.49	0.49				0.08	0.37		0.24	0.24	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
Q1	13.6	0.0	4.3				0.9	6.1		3.8	5.0	
kB	0.5	0.9	0.5				0.2	0.5		0.3	0.3	
Q2	4.3	0.0	0.4				0.1	0.7		0.4	1.1	
Q Average	17.9	0.0	4.8				1.1	6.8		4.2	6.1	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.3	1.2				1.2	1.2		1.2	1.2	
BOQ	20.9	0.0	5.7				1.3	8.0		5.0	7.2	
QSRatio												
85th Percentile Output:												
fB%	1.5	1.7	1.6				1.6	1.5		1.6	1.5	
BOQ	26.2	0.0	7.4				1.7	10.4		6.6	9.4	
QSRatio												
90th Percentile Output:												
fB%	1.6	2.0	1.7				1.8	1.7		1.7	1.7	
BOQ	28.0	0.0	8.2				1.9	11.4		7.3	10.3	
QSRatio												
95th Percentile Output:												
fB%	1.7	2.6	2.0				2.1	1.9		2.0	1.9	
BOQ	30.8	0.0	9.3				2.2	12.9		8.3	11.7	
QSRatio												
98th Percentile Output:												
fB%	2.0	3.2	2.4				2.6	2.3		2.4	2.3	
BOQ	35.0	0.0	11.4				2.8	15.5		10.2	14.1	
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-5 NB Ramps

Inter.: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
LGConfig				L		LT	R	L	T		T	R
Volume				286	2	250		427	871		1301	622
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	18.6	0.0				24.9	28.9	7.0 0.0
Yellow	3.2					3.2	3.6	3.6
All Red	0.5					0.5	0.5	0.5

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	347	1770	0.87	0.20	57.1	E		
LT	365	1863	0.01	0.20	30.8	C	56.6	E
R	310	1583	0.85	0.20	56.2	E		
Northbound								
L	464	1770	0.97	0.26	68.1	E		
T	3664	5074	0.25	0.72	4.5	A	25.4	C
Southbound								
T	2136	5074	0.64	0.42	22.5	C	33.8	C
R	667	1583	0.98	0.42	57.4	E		

Intersection Delay = 34.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Redhill Ave at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-5 NB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				286	2	250	427	871			1301	622
% Heavy Veh				2	2	2	2	2			2	2
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
PK 15 Vol				75	1	66	112	229			342	164
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900	1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
LGConfig				L		LT	R	L		T			T	R
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0	
Adj Flow				301	2	263	449	917			1369	655
%InSharedLn				0								
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000
Peds Bikes	0				0						0	
Buses				0	0	0	0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Arriv. Type				3	3	3	3	3			3	3
Unit Ext.				3.0	3.0	3.0	3.0	3.0			3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ext of g				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	18.6	0.0				24.9	28.9	7.0	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				286	2	250	427	871			1301	622
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
Adj flow				301	2	263	449	917			1369	655
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
Lane group				L		LT	R	L		T			T	R
Adj flow				301	2	263	449	917			1369	655
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	LT	R	L	T		T	R	
So				1900	1900	1900	1900	1900		1900	1900	
Lanes	0	0	0	1	1	1	1	3	0	3	1	
fW				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fHV				0.980	0.980	0.980	0.980	0.980		0.980	0.980	
fG				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fP				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fBB				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fA				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fLU				1.000	1.000	1.000	1.000	0.908		0.908	1.000	
fRT					1.000	0.850		1.000		1.000	0.850	
fLT				0.950	1.000		0.950	1.000		1.000		
Sec.												
fLpb				1.000	1.000		1.000	1.000		1.000		
fRpb					1.000	1.000		1.000		1.000	1.000	
S				1770	1863	1583	1770	5074		5074	1583	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	301	1770	#	0.17	0.20	347	0.87
Prot								
Perm								
Thru	LT	2	1863		0.00	0.20	365	0.01
Right	R	263	1583		0.17	0.20	310	0.85
Northbound								
Prot								
Perm								
Left	L	449	1770	#	0.25	0.26	464	0.97
Prot								
Perm								
Thru	T	917	5074		0.18	0.72	3664	0.25
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1369	5074		0.27	0.42	2136	0.64
Right	R	655	1583	#	0.41	0.42	667	0.98

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.84
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.95

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.87	0.20	37.0	1.000	347	0.40	20.1	0.0	57.1	E		
LT	0.01	0.20	30.8	1.000	365	0.11	0.0	0.0	30.8	C	56.6	E
R	0.85	0.20	36.8	1.000	310	0.38	19.3	0.0	56.2	E		
Northbound												
L	0.97	0.26	34.7	1.000	464	0.47	33.4	0.0	68.1	E		
T	0.25	0.72	4.5	1.000	3664	0.11	0.0	0.0	4.5	A	25.4	C
Southbound												

T	0.64	0.42	21.8	1.000	2136	0.22	0.7	0.0	22.5	C	33.8	C
R	0.98	0.42	27.1	1.000	667	0.49	30.2	0.0	57.4	E		

Intersection delay = 34.1 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	38.2	37.0	0.00	0.0	0.0	57.1
LT	0.0	0.00	38.2	30.8	0.00	0.0	0.0	30.8
R	0.0	0.00	38.2	36.8	0.00	0.0	0.0	56.2
Northbound								
L	0.0	0.00	35.0	34.7	0.00	0.0	0.0	68.1
T	0.0	0.00	13.2	4.5	0.00	0.0	0.0	4.5
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	27.5	21.8	0.00	0.0	0.0	22.5
R	0.0	0.00	27.5	27.1	0.00	0.0	0.0	57.4

Intersection Delay 34.1 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound				Southbound		
LaneGroup				L	LT	R	L	T			T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0			0.0	0.0	
Flow Rate				301	2	263	449	336			502	655	
So				1900	1900	1900	1900	1900			1900	1900	
No.Lanes	0	0	0	1	1	1	1	3	0	0	3	1	
SL				1770	1863	1583	1770	1862			1862	1583	
LnCapacity				347	365	310	464	1345			784	667	
Flow Ratio				0.2	0.0	0.2	0.3	0.2			0.3	0.4	
v/c Ratio				0.87	0.01	0.85	0.97	0.25			0.64	0.98	
Grn Ratio				0.20	0.20	0.20	0.26	0.72			0.42	0.42	
I Factor					1.000			1.000			1.000		
AT or PVG				3	3	3	3	3			3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00			1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00			1.00	1.00	
Q1				7.7	0.0	6.7	11.7	3.0			10.5	17.1	
kB				0.4	0.4	0.4	0.4	0.9			0.6	0.6	
Q2				1.9	0.0	1.6	4.2	0.3			1.1	6.1	
Q Average				9.6	0.0	8.3	15.9	3.3			11.6	23.1	
Q Spacing				25.0	25.0	25.0	25.0	25.0			25.0	25.0	
Q Storage				0	0	0	0	0			0	0	
Q S Ratio													
70th Percentile Output:													
fB%				1.2	1.2	1.2	1.2	1.2			1.2	1.2	
BOQ				11.3	0.1	9.8	18.5	3.9			13.6	26.7	
QSRatio													
85th Percentile Output:													
fB%				1.5	1.6	1.5	1.5	1.6			1.5	1.4	
BOQ				14.5	0.1	12.6	23.5	5.2			17.4	33.3	
QSRatio													
90th Percentile Output:													
fB%				1.6	1.8	1.7	1.6	1.7			1.6	1.5	
BOQ				15.8	0.1	13.7	25.1	5.7			18.8	35.3	
QSRatio													
95th Percentile Output:													
fB%				1.9	2.1	1.9	1.7	2.0			1.8	1.7	
BOQ				17.7	0.1	15.5	27.8	6.6			21.0	38.5	
QSRatio													
98th Percentile Output:													
fB%				2.2	2.7	2.2	2.0	2.5			2.1	1.9	
BOQ				20.8	0.1	18.4	31.7	8.1			24.4	43.2	
QSRatio													

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-5 NB Ramps

Inter.: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
LGConfig				L		LT	R	L	T		T	R
Volume				316	36	402	447	1081			752	302
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	20.6	0.0				21.0	6.5	6.2 0.0
Yellow	3.2					3.2	3.6	3.6
All Red	0.5					0.5	0.5	0.5

Cycle Length: 69.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
Westbound								
L	522	1770	0.64	0.29	24.0	C		
LT	549	1863	0.07	0.29	17.8	B	34.8	C
R	467	1583	0.91	0.29	44.8	D		
Northbound								
L	532	1770	0.89	0.30	39.6	D		
T	3012	5074	0.38	0.59	7.5	A	16.9	B
Southbound								
T	1220	5074	0.65	0.24	25.1	C	29.5	C
R	380	1583	0.84	0.24	40.3	D		

Intersection Delay = 24.9 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Redhill Ave at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-5 NB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				316	36	402	447	1081			752	302
% Heavy Veh				2	2	2	2	2			2	2
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
PK 15 Vol				83	9	106	118	284			198	79
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900	1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
LGConfig				L		LT	R	L		T			T	R
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0	
Adj Flow				333	38	423	471	1138			792	318
%InSharedLn				0								
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000
Peds Bikes	0				0						0	
Buses				0	0	0	0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Arriv. Type				3	3	3	3	3			3	3
Unit Ext.				3.0	3.0	3.0	3.0	3.0			3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ext of g				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	20.6	0.0				21.0	6.5	6.2	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 69.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				316	36	402	447	1081			752	302
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
Adj flow				333	38	423	471	1138			792	318
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
Lane group				L		LT	R	L		T			T	R
Adj flow				333	38	423	471	1138			792	318
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	LT	R	L	T		T	R	
So				1900	1900	1900	1900	1900		1900	1900	
Lanes	0	0	0	1	1	1	1	3	0	3	1	
fW				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fHV				0.980	0.980	0.980	0.980	0.980		0.980	0.980	
fG				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fP				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fBB				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fA				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fLU				1.000	1.000	1.000	1.000	0.908		0.908	1.000	
fRT					1.000	0.850		1.000		1.000	0.850	
fLT				0.950	1.000		0.950	1.000		1.000		
Sec.												
fLpb				1.000	1.000		1.000	1.000		1.000		
fRpb					1.000	1.000		1.000		1.000	1.000	
S				1770	1863	1583	1770	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	333	1770		0.19	0.29	522	0.64
Prot								
Perm								
Thru	LT	38	1863		0.02	0.29	549	0.07
Right	R	423	1583	#	0.27	0.29	467	0.91
Northbound								
Prot								
Perm								
Left	L	471	1770	#	0.27	0.30	532	0.89
Prot								
Perm								
Thru	T	1138	5074		0.22	0.59	3012	0.38
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	792	5074		0.16	0.24	1220	0.65
Right	R	318	1583	#	0.20	0.24	380	0.84

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.73
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.88

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.64	0.29	21.4	1.000	522	0.22	2.6	0.0	24.0	C		
LT	0.07	0.29	17.7	1.000	549	0.11	0.1	0.0	17.8	B	34.8	C
R	0.91	0.29	23.7	1.000	467	0.43	21.1	0.0	44.8	D		
Northbound												
L	0.89	0.30	23.3	1.000	532	0.41	16.3	0.0	39.6	D		
T	0.38	0.59	7.4	1.000	3012	0.11	0.1	0.0	7.5	A	16.9	B
Southbound												

T	0.65	0.24	23.9	1.000	1220	0.23	1.2	0.0	25.1	C	29.5	C
R	0.84	0.24	25.2	1.000	380	0.37	15.0	0.0	40.3	D		

Intersection delay = 24.9 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	69.9 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	69.9 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	69.9 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	24.6	21.4	0.00	0.0	0.0	24.0
LT	0.0	0.00	24.6	17.7	0.00	0.0	0.0	17.8
R	0.0	0.00	24.6	23.7	0.00	0.0	0.0	44.8
Northbound								
L	0.0	0.00	24.5	23.3	0.00	0.0	0.0	39.6
T	0.0	0.00	14.2	7.4	0.00	0.0	0.0	7.5
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	26.6	23.9	0.00	0.0	0.0	25.1
R	0.0	0.00	26.6	25.2	0.00	0.0	0.0	40.3

Intersection Delay 24.9 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound				Southbound		
LaneGroup				L	LT	R	L	T			T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0			0.0	0.0	
Flow Rate				333	38	423	471	417			290	318	
So				1900	1900	1900	1900	1900			1900	1900	
No.Lanes	0	0	0	1	1	1	1	3	0	0	3	1	
SL				1770	1863	1583	1770	1862			1862	1583	
LnCapacity				522	549	467	532	1105			447	380	
Flow Ratio				0.2	0.0	0.3	0.3	0.2			0.2	0.2	
v/c Ratio				0.64	0.07	0.91	0.89	0.38			0.65	0.84	
Grn Ratio				0.29	0.29	0.29	0.30	0.59			0.24	0.24	
I Factor					1.000			1.000			1.000		
AT or PVG				3	3	3	3	3			3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00			1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00			1.00	1.00	
Q1				5.6	0.5	7.9	8.7	4.2			5.1	5.9	
kB				0.4	0.4	0.4	0.4	0.6			0.4	0.3	
Q2				0.7	0.0	2.5	2.4	0.4			0.7	1.4	
Q Average				6.3	0.6	10.4	11.1	4.6			5.7	7.3	
Q Spacing				25.0	25.0	25.0	25.0	25.0			25.0	25.0	
Q Storage				0	0	0	0	0			0	0	
Q S Ratio													
70th Percentile Output:													
fB%				1.2	1.2	1.2	1.2	1.2			1.2	1.2	
BOQ				7.5	0.7	12.2	13.1	5.5			6.8	8.6	
QSRatio													
85th Percentile Output:													
fB%				1.5	1.6	1.5	1.5	1.6			1.5	1.5	
BOQ				9.7	0.9	15.7	16.7	7.2			8.9	11.2	
QSRatio													
90th Percentile Output:													
fB%				1.7	1.8	1.6	1.6	1.7			1.7	1.7	
BOQ				10.7	1.0	17.0	18.1	7.9			9.7	12.3	
QSRatio													
95th Percentile Output:													
fB%				1.9	2.1	1.8	1.8	2.0			1.9	1.9	
BOQ				12.1	1.2	19.1	20.2	9.1			11.1	13.9	
QSRatio													
98th Percentile Output:													
fB%				2.3	2.7	2.1	2.1	2.4			2.3	2.3	
BOQ				14.6	1.5	22.3	23.6	11.1			13.4	16.6	
QSRatio													

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-5 SB Ramps

Inter.: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	0	3	1	1	3	0
LGConfig	L		R					T	R	L	T	
Volume	226		457					1069	604	403	1201	
Lane Width	12.0		12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A							
Thru						A	A	
Right	A					A	A	
Peds								
WB Left					A			
Thru					A	A	A	
Right								
Peds								
NB Right								
SB Right								
Green	26.5	0.0			21.3	21.6	10.0	0.0
Yellow	3.2				3.2	3.6	3.6	
All Red	0.5				0.5	0.5	0.5	

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	494	1770	0.48	0.28	29.3	C		
							78.6	E
R	442	1583	1.09	0.28	103.0	F		
Westbound								
Northbound								
T	1907	5074	0.59	0.38	24.3	C	46.7	D
R	595	1583	1.07	0.38	86.3	F		
Southbound								
L	397	1770	1.07	0.22	101.3	F		
T	3242	5074	0.39	0.64	8.3	A	31.7	C

Intersection Delay = 46.1 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Redhill Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-5 SB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	226	457						1069	604	403	1201	
% Heavy Veh	2	2						2	2	2	2	
PHF	0.95	0.95						0.95	0.95	0.95	0.95	
PK 15 Vol	59	120						281	159	106	316	
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900						1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	1	0	1	0	0	0	0	3	1	1	3	0
LGConfig	L		R					T	R	L	T	
Lane Width	12.0		12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			
Adj Flow	238		481					1125	636	424	1264	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000	0.000		
Peds Bikes	0			0				0				
Buses	0		0					0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0	0.0	0.0	
Arriv. Type	3		3					3	3	3	3	
Unit Ext.	3.0		3.0					3.0	3.0	3.0	3.0	
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0	2.0	2.0	
Ext of g	2.0		2.0					2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru					Thru		A	A
Right		A			Right		A	A
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		26.5	0.0			21.3	21.6	10.0	0.0
Yellow		3.2				3.2	3.6	3.6	
All Red		0.5				0.5	0.5	0.5	

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	226	457						1069	604	403	1201	
PHF	0.95	0.95						0.95	0.95	0.95	0.95	
Adj flow	238	481						1125	636	424	1264	
No. Lanes	1	0	1	0	0	0	0	3	1	1	3	0
Lane group	L		R					T	R	L	T	
Adj flow	238		481					1125	636	424	1264	
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000	0.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound			Southbound	
LG	L		R				T	R	L	T	
So	1900		1900				1900	1900	1900	1900	
Lanes	1	0	1	0	0	0	3	1	1	3	0
fW	1.000		1.000				1.000	1.000	1.000	1.000	
fHV	0.980		0.980				0.980	0.980	0.980	0.980	
fG	1.000		1.000				1.000	1.000	1.000	1.000	
fP	1.000		1.000				1.000	1.000	1.000	1.000	
fBB	1.000		1.000				1.000	1.000	1.000	1.000	
fA	1.000		1.000				1.000	1.000	1.000	1.000	
fLU	1.000		1.000				0.908	1.000	1.000	0.908	
fRT			0.850				1.000	0.850		1.000	
fLT	0.950						1.000		0.950	1.000	
Sec.											
fLpb	1.000						1.000		1.000	1.000	
fRpb			1.000				1.000	1.000		1.000	
S	1770		1583				5074	1583	1770	5074	
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	238	1770		0.13	0.28	494	0.48
Prot								
Perm								
Thru								
Right	R	481	1583	#	0.30	0.28	442	1.09
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1125	5074		0.22	0.38	1907	0.59
Right	R	636	1583	#	0.40	0.38	595	1.07
Southbound								
Prot								
Perm								
Left	L	424	1770	#	0.24	0.22	397	1.07
Prot								
Perm								
Thru	T	1264	5074		0.25	0.64	3242	0.39
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.95
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.08

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.48	0.28	28.5	1.000	494	0.11	0.7	0.0	29.3	C		
											78.6	E
R	1.09	0.28	34.3	1.000	442	0.50	68.7	0.0	103.0	F		
Westbound												
Northbound												
T	0.59	0.38	23.8	1.000	1907	0.18	0.5	0.0	24.3	C	46.7	D
R	1.07	0.38	29.6	1.000	595	0.50	56.7	0.0	86.3	F		
Southbound												
L	1.07	0.22	36.9	1.000	397	0.50	64.4	0.0	101.3	F		

T	0.39	0.64	8.2	1.000	3242	0.11	0.1	0.0	8.3	A	31.7	C

Intersection delay = 46.1 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	34.3	28.5	0.00	0.0	0.0	29.3

	0.0						0.0	
R	0.0	0.00	34.3	34.3	0.00	9.7	0.0	103.0
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	29.6	23.8	0.00	0.0	0.0	24.3
R	0.0	0.00	29.6	29.6	0.00	10.3	0.0	86.3
Southbound								
L	0.0	0.00	36.9	36.9	0.00	6.8	0.0	101.3
T	0.0	0.00	17.2	8.2	0.00	0.0	0.0	8.3
	0.0						0.0	

Intersection Delay 46.1 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	L	T
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	238	481			412	636	424	464
So	1900	1900			1900	1900	1900	1900
No.Lanes	1 0	1	0 0 0		0 3	1	1	3 0
SL	1770	1583			1862	1583	1770	1862
LnCapacity	494	442			700	595	397	1190
Flow Ratio	0.1	0.3			0.2	0.4	0.2	0.2
v/c Ratio	0.48	1.09			0.59	1.07	1.07	0.39
Grn Ratio	0.28	0.28			0.38	0.38	0.22	0.64
I Factor	1.000				1.000			1.000
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00	1.00	1.00	1.00
Q1	5.2	12.7			8.7	16.8	11.2	5.9
kB	0.5	0.4			0.6	0.5	0.4	0.8
Q2	0.4	8.1			0.8	9.5	6.6	0.5
Q Average	5.7	20.8			9.5	26.3	17.8	6.4
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2	1.2	1.2	1.2
BOQ	6.7	24.1			11.2	30.3	20.8	7.6
QSRatio								
85th Percentile Output:								
fB%	1.5	1.4			1.5	1.4	1.5	1.5
BOQ	8.8	30.2			14.5	37.4	26.1	9.9
QSRatio								
90th Percentile Output:								
fB%	1.7	1.5			1.6	1.5	1.6	1.7
BOQ	9.6	32.1			15.7	39.6	27.9	10.8
QSRatio								
95th Percentile Output:								
fB%	1.9	1.7			1.9	1.6	1.7	1.9
BOQ	11.0	35.1			17.6	43.1	30.7	12.3
QSRatio								
98th Percentile Output:								
fB%	2.3	1.9			2.2	1.8	2.0	2.3
BOQ	13.3	39.6			20.8	48.2	34.8	14.8
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-5 SB Ramps

Inter.: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	0	3	1	1	3	0
LGConfig	L		R					T	R	L	T	
Volume	414		325					1111	454	299	768	
Lane Width	12.0		12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru					Thru		A	A	
Right	A				Right		A	A	
Peds					Peds				
WB Left					SB Left	A			
Thru					Thru	A	A	A	
Right					Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	18.2	0.0				12.7	9.3	9.2	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	496	1770	0.88	0.28	38.8	D		
							34.8	C
R	443	1583	0.77	0.28	29.7	C		
Westbound								
Northbound								
T	1764	5074	0.66	0.35	18.9	B	23.2	C
R	550	1583	0.87	0.35	33.8	C		
Southbound								
L	346	1770	0.91	0.20	52.8	D		
T	3044	5074	0.27	0.60	6.2	A	19.3	B

Intersection Delay = 24.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Redhill Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-5 SB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	414		325					1111	454	299	768	
% Heavy Veh	2		2					2	2	2	2	
PHF	0.95		0.95					0.95	0.95	0.95	0.95	
PK 15 Vol	109		86					292	119	79	202	
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	1	0	1	0	0	0	0	3	1	1	3	0
LGConfig	L		R					T	R	L	T	
Lane Width	12.0		12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			
Adj Flow	436		342					1169	478	315	808	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000	0.000		
Peds Bikes	0			0				0				
Buses	0		0					0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0	0.0	0.0	
Arriv. Type	3		3					3	3	3	3	
Unit Ext.	3.0		3.0					3.0	3.0	3.0	3.0	
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0	2.0	2.0	
Ext of g	2.0		2.0					2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	18.2	0.0			12.7	9.3	9.2	0.0
Yellow	3.2				3.2	3.6	3.6	
All Red	0.5				0.5	0.5	0.5	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	414		325					1111	454	299	768	
PHF	0.95		0.95					0.95	0.95	0.95	0.95	
Adj flow	436		342					1169	478	315	808	
No. Lanes	1	0	1	0	0	0	0	3	1	1	3	0
Lane group	L		R					T	R	L	T	
Adj flow	436		342					1169	478	315	808	
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000	0.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound		Southbound		
LG	L		R				T	R	L	T	
So	1900		1900				1900	1900	1900	1900	
Lanes	1	0	1	0	0	0	3	1	1	3	0
fW	1.000		1.000				1.000	1.000	1.000	1.000	
fHV	0.980		0.980				0.980	0.980	0.980	0.980	
fG	1.000		1.000				1.000	1.000	1.000	1.000	
fP	1.000		1.000				1.000	1.000	1.000	1.000	
fBB	1.000		1.000				1.000	1.000	1.000	1.000	
fA	1.000		1.000				1.000	1.000	1.000	1.000	
fLU	1.000		1.000				0.908	1.000	1.000	0.908	
fRT			0.850				1.000	0.850		1.000	
fLT	0.950						1.000		0.950	1.000	
Sec.											
fLpb	1.000						1.000		1.000	1.000	
fRpb			1.000				1.000	1.000		1.000	
S	1770		1583				5074	1583	1770	5074	
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	436	1770	#	0.25	0.28	496	0.88
Prot								
Perm								
Thru								
Right	R	342	1583		0.22	0.28	443	0.77
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1169	5074		0.23	0.35	1764	0.66
Right	R	478	1583	#	0.30	0.35	550	0.87
Southbound								
Prot								
Perm								
Left	L	315	1770	#	0.18	0.20	346	0.91
Prot								
Perm								
Thru	T	808	5074		0.16	0.60	3044	0.27
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.73
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.88

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.88	0.28	22.3	1.000	496	0.41	16.4	0.0	38.8	D		
											34.8	C
R	0.77	0.28	21.5	1.000	443	0.32	8.2	0.0	29.7	C		
Westbound												
Northbound												
T	0.66	0.35	18.0	1.000	1764	0.24	0.9	0.0	18.9	B	23.2	C
R	0.87	0.35	19.8	1.000	550	0.40	14.0	0.0	33.8	C		
Southbound												
L	0.91	0.20	25.6	1.000	346	0.43	27.2	0.0	52.8	D		

T 0.27 0.60 6.2 1.000 3044 0.11 0.0 0.0 6.2 A 19.3 B

Intersection delay = 24.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	23.4	22.3	0.00	0.0	0.0	38.8

	0.0						0.0	
R	0.0	0.00	23.4	21.5	0.00	0.0	0.0	29.7
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	21.2	18.0	0.00	0.0	0.0	18.9
R	0.0	0.00	21.2	19.8	0.00	0.0	0.0	33.8
Southbound								
L	0.0	0.00	26.1	25.6	0.00	0.0	0.0	52.8
T	0.0	0.00	13.0	6.2	0.00	0.0	0.0	6.2
	0.0						0.0	

Intersection Delay 24.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	L	T
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	436	342			429	478	315	296
So	1900	1900			1900	1900	1900	1900
No.Lanes	1 0	1	0 0 0		3	1	1	3 0
SL	1770	1583			1862	1583	1770	1862
LnCapacity	496	443			647	550	346	1117
Flow Ratio	0.2	0.2			0.2	0.3	0.2	0.2
v/c Ratio	0.88	0.77			0.66	0.87	0.91	0.26
Grn Ratio	0.28	0.28			0.35	0.35	0.20	0.60
I Factor	1.000				1.000			1.000
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00	1.00	1.00	1.00
Q1	7.5	5.7			6.6	8.1	5.6	2.5
kB	0.4	0.3			0.4	0.4	0.3	0.6
Q2	2.1	1.1			0.8	2.1	2.0	0.2
Q Average	9.6	6.8			7.4	10.2	7.6	2.8
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2	1.2	1.2	1.2
BOQ	11.4	8.0			8.8	12.0	9.0	3.3
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5			1.5	1.5	1.5	1.6
BOQ	14.6	10.4			11.4	15.4	11.6	4.3
QSRatio								
90th Percentile Output:								
fB%	1.6	1.7			1.7	1.6	1.7	1.7
BOQ	15.9	11.4			12.4	16.7	12.7	4.8
QSRatio								
95th Percentile Output:								
fB%	1.9	1.9			1.9	1.8	1.9	2.0
BOQ	17.8	12.9			14.0	18.8	14.3	5.6
QSRatio								
98th Percentile Output:								
fB%	2.2	2.3			2.3	2.2	2.3	2.5
BOQ	21.0	15.5			16.8	22.0	17.1	6.9
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-5 SB Ramps

Inter.: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Newport Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	0	1	0	2	1	1	2	0
LGConfig	L	LT	R	L		R		T	R	L	T	
Volume	379	79	334	30		119		864	66	182	1121	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		A			NB Left				
Thru		A			Thru		A	A	
Right		A			Right		A	A	
Peds					Peds				
WB Left	A				SB Left	A			
Thru					Thru	A	A	A	
Right	A				Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	7.2	19.9	0.0			12.2	10.0	7.5	0.0
Yellow	3.6	3.6				3.2	3.9	3.9	
All Red	1.0	1.0				1.0	1.0	1.0	

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	440	1770	0.91	0.25	51.4	D		
LT	463	1863	0.18	0.25	23.8	C	48.5	D
R	394	1583	0.89	0.25	50.9	D		
Westbound								
L	159	1770	0.20	0.09	34.4	C		
							69.4	E
R	142	1583	0.88	0.09	78.4	E		
Northbound								
T	993	3547	0.92	0.28	40.6	D	39.3	D
R	443	1583	0.16	0.28	21.8	C		
Southbound								
L	270	1770	0.71	0.15	40.7	D		
T	1720	3547	0.69	0.48	17.1	B	20.4	C

Intersection Delay = 35.2 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Newport Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-5 SB Ramps N/S St: Newport Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	379	79	334	30		119		864	66	182	1121	
% Heavy Veh	2	2	2	2		2		2	2	2	2	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol	100	21	88	8		31		227	17	48	295	
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900	1900	1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	1	1	1	1	0	1	0	2	1	1	2	0
LGConfig	L	LT	R	L		R		T	R	L	T	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			
Adj Flow	399	83	352	32		125		909	69	192	1180	
%InSharedLn	0											
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.000	1.000		0.000	
Peds Bikes	0			0			0					
Buses	0	0	0	0		0		0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type	3	3	3	3		3		3	3	3	3	
Unit Ext.	3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0	2.0	2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	7.2	19.9	0.0		12.2	10.0	7.5	0.0
Yellow	3.6	3.6			3.2	3.9	3.9	
All Red	1.0	1.0			1.0	1.0	1.0	

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	379	79	334	30		119		864	66	182	1121	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow	399	83	352	32		125		909	69	192	1180	
No. Lanes	1	1	1	1	0	1	0	2	1	1	2	0
Lane group	L	LT	R	L		R		T	R	L	T	
Adj flow	399	83	352	32		125		909	69	192	1180	
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LT	R	L		R	T	R	L	T		
So	1900	1900	1900	1900		1900	1900	1900	1900	1900		
Lanes	1	1	1	1	0	1	2	1	1	2	0	
fW	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fHV	0.980	0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980		
fG	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fP	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fBB	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fA	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fLU	1.000	1.000	1.000	1.000		1.000	0.952	1.000	1.000	0.952		
fRT		1.000	0.850			0.850	1.000	0.850		1.000		
fLT	0.950	1.000		0.950			1.000		0.950	1.000		
Sec.												
fLpb	1.000	1.000		1.000			1.000		1.000	1.000		
fRpb		1.000	1.000			1.000	1.000	1.000		1.000		
S	1770	1863	1583	1770		1583	3547	1583	1770	3547		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	399	1770	#	0.23	0.25	440	0.91
Prot								
Perm								
Thru	LT	83	1863		0.04	0.25	463	0.18
Right	R	352	1583		0.22	0.25	394	0.89
Westbound								
Prot								
Perm								
Left	L	32	1770		0.02	0.09	159	0.20
Prot								
Perm								
Thru								
Right	R	125	1583	#	0.08	0.09	142	0.88
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	909	3547	#	0.26	0.28	993	0.92
Right	R	69	1583		0.04	0.28	443	0.16
Southbound								
Prot								
Perm								
Left	L	192	1770	#	0.11	0.15	270	0.71
Prot								
Perm								
Thru	T	1180	3547		0.33	0.48	1720	0.69
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.67
Total lost time per cycle, L = 18.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.87

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.91	0.25	29.2	1.000	440	0.43	22.2	0.0	51.4	D		
LT	0.18	0.25	23.6	1.000	463	0.11	0.2	0.0	23.8	C	48.5	D
R	0.89	0.25	29.0	1.000	394	0.42	21.9	0.0	50.9	D		
Westbound												
L	0.20	0.09	33.7	1.000	159	0.11	0.6	0.0	34.4	C		
											69.4	E
R	0.88	0.09	36.0	1.000	142	0.41	42.4	0.0	78.4	E		
Northbound												
T	0.92	0.28	27.9	1.000	993	0.43	12.8	0.0	40.6	D	39.3	D
R	0.16	0.28	21.7	1.000	443	0.11	0.2	0.0	21.8	C		
Southbound												
L	0.71	0.15	32.2	1.000	270	0.27	8.5	0.0	40.7	D		

T	0.69	0.48	15.9	1.000	1720	0.26	1.2	0.0	17.1	B	20.4	C

Intersection delay = 35.2 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.952	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.952	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	30.0	29.2	0.00	0.0	0.0	51.4

LT	0.0	0.00	30.0	23.6	0.00	0.0	0.0	23.8
R	0.0	0.00	30.0	29.0	0.00	0.0	0.0	50.9
Westbound								
L	0.0	0.00	36.4	33.7	0.00	0.0	0.0	34.4
	0.0						0.0	
R	0.0	0.00	36.4	36.0	0.00	0.0	0.0	78.4
Northbound								
	0.0						0.0	
T	0.0	0.00	28.8	27.9	0.00	0.0	0.0	40.6
R	0.0	0.00	28.8	21.7	0.00	0.0	0.0	21.8
Southbound								
L	0.0	0.00	33.9	32.2	0.00	0.0	0.0	40.7
T	0.0	0.00	20.6	15.9	0.00	0.0	0.0	17.1
	0.0						0.0	

Intersection Delay 35.2 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup	L	LT	R	L	R	T	R	L	T
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate	399	83	352	32	125	477	69	192	619
So	1900	1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	1	1	1	1 0	1	0 2	1	1	2 0
SL	1770	1863	1583	1770	1583	1862	1583	1770	1862
LnCapacity	440	463	394	159	142	521	443	270	903
Flow Ratio	0.2	0.0	0.2	0.0	0.1	0.3	0.0	0.1	0.3
v/c Ratio	0.91	0.18	0.89	0.20	0.88	0.92	0.16	0.71	0.69
Grn Ratio	0.25	0.25	0.25	0.09	0.09	0.28	0.28	0.15	0.48
I Factor		1.000		1.000		1.000			1.000
AT or PVG	3	3	3	3	3	3	3	3	3
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Q1	8.6	1.5	7.6	0.7	2.7	10.3	1.2	4.1	10.6
kB	0.4	0.4	0.4	0.2	0.2	0.4	0.4	0.3	0.6
Q2	2.6	0.1	2.2	0.1	1.0	3.0	0.1	0.7	1.3
Q Average	11.2	1.5	9.7	0.7	3.7	13.3	1.2	4.7	11.9
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage	0	0	0	0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
BOQ	13.1	1.8	11.5	0.9	4.5	15.6	1.5	5.6	14.0
QSRatio									
85th Percentile Output:									
fB%	1.5	1.6	1.5	1.6	1.6	1.5	1.6	1.6	1.5
BOQ	16.8	2.4	14.8	1.1	5.9	19.9	1.9	7.4	17.8
QSRatio									
90th Percentile Output:									
fB%	1.6	1.8	1.6	1.8	1.7	1.6	1.8	1.7	1.6
BOQ	18.2	2.7	16.0	1.3	6.5	21.4	2.2	8.1	19.3
QSRatio									
95th Percentile Output:									
fB%	1.8	2.1	1.8	2.1	2.0	1.8	2.1	2.0	1.8
BOQ	20.3	3.2	18.0	1.5	7.4	23.8	2.5	9.3	21.5
QSRatio									
98th Percentile Output:									
fB%	2.1	2.6	2.2	2.6	2.4	2.1	2.6	2.4	2.1
BOQ	23.7	4.0	21.1	1.9	9.2	27.4	3.2	11.3	25.0
QSRatio									

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: Robert Chan
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-5 SB Ramps

Inter.: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Newport Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	0	1	0	2	1	1	2	0
LGConfig	L	LT	R	L		R		T	R	L	T	
Volume	415	62	531	67		190		1207	64	230	883	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		A			NB Left				
Thru		A			Thru		A	A	
Right		A			Right		A	A	
Peds					Peds				
WB Left	A				SB Left	A			
Thru					Thru	A	A	A	
Right	A				Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	10.6	35.9	0.0			11.3	7.8	26.2	0.0
Yellow	3.6	3.6				3.2	3.9	3.9	
All Red	1.0	1.0				1.0	1.0	1.0	

Cycle Length: 115.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	553	1770	0.79	0.31	43.7	D		
LT	582	1863	0.11	0.31	28.3	C	83.7	F
R	494	1583	1.13	0.31	121.4	F		
Westbound								
L	163	1770	0.44	0.09	51.2	D		
							202.3	F
R	146	1583	1.37	0.09	255.9	F		
Northbound								
T	1200	3547	1.06	0.34	81.2	F	78.5	E
R	535	1583	0.13	0.34	26.4	C		
Southbound								
L	174	1770	1.39	0.10	259.0	F		
T	1678	3547	0.55	0.47	22.0	C	71.0	E

Intersection Delay = 86.4 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	Robert Chan
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Newport Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-5 SB Ramps N/S St: Newport Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	415	62	531	67		190		1207	64	230	883	
% Heavy Veh	2	2	2	2		2		2	2	2	2	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol	109	16	140	18		50		318	17	61	232	
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900	1900	1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	1	1	1	1	0	1	0	2	1	1	2	0
LGConfig	L	LT	R	L		R		T	R	L	T	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol		0				0			0			
Adj Flow	437	65	559	71		200		1271	67	242	929	
%InSharedLn	0											
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.000	1.000		0.000	
Peds Bikes	0			0			0					
Buses	0	0	0	0		0		0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type	3	3	3	3		3		3	3	3	3	
Unit Ext.	3.0	3.0	3.0	3.0		3.0		3.0	3.0	3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0	2.0	2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	10.6	35.9	0.0		11.3	7.8	26.2	0.0
Yellow	3.6	3.6			3.2	3.9	3.9	
All Red	1.0	1.0			1.0	1.0	1.0	

Cycle Length: 115.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	415	62	531	67		190		1207	64	230	883	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow	437	65	559	71		200		1271	67	242	929	
No. Lanes	1	1	1	1	0	1	0	2	1	1	2	0
Lane group	L	LT	R	L		R		T	R	L	T	
Adj flow	437	65	559	71		200		1271	67	242	929	
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LT	R	L		R	T	R	L	T		
So	1900	1900	1900	1900		1900	1900	1900	1900	1900		
Lanes	1	1	1	1	0	1	2	1	1	2	0	
fW	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fHV	0.980	0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980		
fG	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fP	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fBB	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fA	1.000	1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000		
fLU	1.000	1.000	1.000	1.000		1.000	0.952	1.000	1.000	0.952		
fRT		1.000	0.850			0.850	1.000	0.850		1.000		
fLT	0.950	1.000		0.950			1.000		0.950	1.000		
Sec.												
fLpb	1.000	1.000		1.000			1.000		1.000	1.000		
fRpb		1.000	1.000			1.000	1.000	1.000		1.000		
S	1770	1863	1583	1770		1583	3547	1583	1770	3547		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	437	1770		0.25	0.31	553	0.79
Prot								
Perm								
Thru	LT	65	1863		0.03	0.31	582	0.11
Right	R	559	1583	#	0.35	0.31	494	1.13
Westbound								
Prot								
Perm								
Left	L	71	1770		0.04	0.09	163	0.44
Prot								
Perm								
Thru								
Right	R	200	1583	#	0.13	0.09	146	1.37
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1271	3547	#	0.36	0.34	1200	1.06
Right	R	67	1583		0.04	0.34	535	0.13
Southbound								
Prot								
Perm								
Left	L	242	1770	#	0.14	0.10	174	1.39
Prot								
Perm								
Thru	T	929	3547		0.26	0.47	1678	0.55
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.97
Total lost time per cycle, L = 18.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.16

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.79	0.31	36.1	1.000	553	0.34	7.6	0.0	43.7	D		
LT	0.11	0.31	28.2	1.000	582	0.11	0.1	0.0	28.3	C	83.7	F
R	1.13	0.31	39.6	1.000	494	0.50	81.9	0.0	121.4	F		
Westbound												
L	0.44	0.09	49.4	1.000	163	0.11	1.9	0.0	51.2	D		
											202.3	F
R	1.37	0.09	52.2	1.000	146	0.50	203.7	0.0	255.9	F		
Northbound												
T	1.06	0.34	38.1	1.000	1200	0.50	43.2	0.0	81.2	F	78.5	E
R	0.13	0.34	26.3	1.000	535	0.11	0.1	0.0	26.4	C		
Southbound												
L	1.39	0.10	51.9	1.000	174	0.50	207.1	0.0	259.0	F		

T	0.55	0.47	21.6	1.000	1678	0.15	0.4	0.0	22.0	C	71.0	E

Intersection delay = 86.4 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 115.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.952	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 115.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.952	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	115.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	39.6	36.1	0.00	0.0	0.0	43.7

LT	0.0	0.00	39.6	28.2	0.00	0.0	0.0	28.3
R	0.0	0.00	39.6	39.6	0.00	16.2	0.0	121.4
Westbound								
L	0.0	0.00	52.2	49.4	0.00	0.0	0.0	51.2
	0.0						0.0	
R	0.0	0.00	52.2	52.2	0.00	13.5	0.0	255.9
Northbound								
	0.0						0.0	
T	0.0	0.00	38.1	38.1	0.00	17.8	0.0	81.2
R	0.0	0.00	38.1	26.3	0.00	0.0	0.0	26.4
Southbound								
L	0.0	0.00	51.9	51.9	0.00	17.0	0.0	259.0
T	0.0	0.00	30.3	21.6	0.00	0.0	0.0	22.0
	0.0						0.0	

Intersection Delay 86.4 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup	L	LT	R	L	R	T	R	L	T	
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate	437	65	559	71	200	667	67	242	487	
So	1900	1900	1900	1900	1900	1900	1900	1900	1900	
No.Lanes	1	1	1	1	0 1	0 2	1	1	2	0
SL	1770	1863	1583	1770	1583	1862	1583	1770	1862	
LnCapacity	553	582	494	163	146	630	535	174	881	
Flow Ratio	0.2	0.0	0.4	0.0	0.1	0.4	0.0	0.1	0.3	
v/c Ratio	0.79	0.11	1.13	0.44	1.37	1.06	0.13	1.39	0.55	
Grn Ratio	0.31	0.31	0.31	0.09	0.09	0.34	0.34	0.10	0.47	
I Factor		1.000			1.000	1.000			1.000	
AT or PVG	3	3	3	3	3	3	3	3	3	
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
PF2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Q1	12.7	1.5	17.9	2.1	6.4	21.3	1.5	7.7	11.1	
kB	0.6	0.6	0.5	0.3	0.3	0.6	0.5	0.3	0.7	
Q2	1.9	0.1	11.3	0.2	7.6	9.8	0.1	9.4	0.9	
Q Average	14.6	1.6	29.2	2.3	14.0	31.1	1.6	17.1	12.0	
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage	0	0	0	0	0	0	0	0	0	
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2	1.1	1.2	1.2	1.1	1.2	1.2	1.2	
BOQ	17.1	1.9	33.5	2.8	16.4	35.6	1.9	20.0	14.1	
QSRatio										
85th Percentile Output:										
fB%	1.5	1.6	1.4	1.6	1.5	1.4	1.6	1.5	1.5	
BOQ	21.7	2.5	41.3	3.7	20.8	43.7	2.5	25.2	18.0	
QSRatio										
90th Percentile Output:										
fB%	1.6	1.8	1.5	1.8	1.6	1.5	1.8	1.6	1.6	
BOQ	23.3	2.7	43.6	4.1	22.3	46.2	2.8	26.9	19.4	
QSRatio										
95th Percentile Output:										
fB%	1.8	2.1	1.6	2.0	1.8	1.6	2.1	1.7	1.8	
BOQ	25.8	3.2	47.3	4.8	24.8	50.0	3.2	29.7	21.7	
QSRatio										
98th Percentile Output:										
fB%	2.0	2.6	1.8	2.5	2.0	1.8	2.6	2.0	2.1	
BOQ	29.6	4.0	52.7	6.0	28.5	55.7	4.0	33.7	25.2	
QSRatio										

ERROR MESSAGES

No errors to report

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-405 NB Ramps

Inter.: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Volume				732		438		694	633		1103	979
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right	A	A		
Peds					Peds				
NB Right		A			EB Right				
SB Right		A			WB Right				
Green		23.6	0.0			10.2	4.5	0.0	
Yellow		4.3				4.3	3.6		
All Red		3.5				3.5	2.5		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1352	3437	0.57	0.39	14.8	B		
							16.9	B
R	623	1583	0.74	0.39	20.3	C		
Northbound								
T	1903	5074	0.38	0.38	13.8	B	7.3	A
R	1583	1583	0.42	1.00	0.2	A		
Southbound								
T	1903	5074	0.61	0.38	15.8	B	8.8	A
R	1583	1583	0.65	1.00	1.0	A		

Intersection Delay = 10.4 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Culver at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-405 NB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				732		438		694	633		1103	979
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				193		115		183	167		290	258
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				771		461		731	666		1161	1031
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		23.6	0.0			10.2	4.5	0.0
Yellow		4.3				4.3	3.6	
All Red		3.5				3.5	2.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				732		438		694	633		1103	979
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				771		461		731	666		1161	1031
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
Lane group				L		R		T	R		T	R
Adj flow				771		461		731	666		1161	1031
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		T		R
So				1900		1900	1900	1900		1900		1900
Lanes	0	0	0	2	0	1	0 3	1	0	3		1
fW				1.000		1.000	1.000	1.000		1.000		1.000
fHV				0.980		0.980	0.980	0.980		0.980		0.980
fG				1.000		1.000	1.000	1.000		1.000		1.000
fP				1.000		1.000	1.000	1.000		1.000		1.000
fBB				1.000		1.000	1.000	1.000		1.000		1.000
fA				1.000		1.000	1.000	1.000		1.000		1.000
fLU				0.971		1.000	0.908	1.000		0.908		1.000
fRT						0.850	1.000	0.850		1.000		0.850
fLT				0.950			1.000			1.000		
Sec.												
fLpb				1.000			1.000			1.000		
fRpb						1.000	1.000	1.000		1.000		1.000
S				3437		1583	5074	1583		5074		1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Westbound							
Prot							
Perm							
Left	L	771	3437	0.22	0.39	1352	0.57
Prot							
Perm							
Thru							
Right	R	461	1583	0.29	0.39	623	0.74
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	731	5074	0.14	0.38	1903	0.38
Right	R	666	1583	0.42	1.00	1583	0.42
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1161	5074	0.23	0.38	1903	0.61
Right	R	1031	1583	# 0.65	1.00	1583	0.65

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.65
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.65

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.57	0.39	14.2	1.000	1352	0.16	0.6	0.0	14.8	B		
											16.9	B
R	0.74	0.39	15.6	1.000	623	0.30	4.7	0.0	20.3	C		
Northbound												
T	0.38	0.38	13.7	1.000	1903	0.11	0.1	0.0	13.8	B	7.3	A
R	0.42	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.61	0.38	15.2	1.000	1903	0.20	0.6	0.0	15.8	B	8.8	A
R	0.65	1.00	0.0	0.950	1583	0.23	1.0	0.0	1.0	A		

Intersection delay = 10.4 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				

EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	18.2	14.2	0.00	0.0	0.0	14.8
	0.0						0.0	
R	0.0	0.00	18.2	15.6	0.00	0.0	0.0	20.3
Northbound								
	0.0						0.0	
T	0.0	0.00	18.8	13.7	0.00	0.0	0.0	13.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	18.8	15.2	0.00	0.0	0.0	15.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.0

Intersection Delay 10.4 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup			L	R		T	R	T	R
Init Queue			0.0	0.0		0.0	0.0	0.0	0.0
Flow Rate			397	461		268	666	426	1031
So			1900	1900		1900	1900	1900	1900
No.Lanes	0	0 0	2	0 1	0	3	1	3	1
SL			1770	1583		1862	1583	1862	1583
LnCapacity			696	623		698	1583	698	1583
Flow Ratio			0.2	0.3		0.1	0.4	0.2	0.7
v/c Ratio			0.57	0.74		0.38	0.42	0.61	0.65
Grn Ratio			0.39	0.39		0.38	1.00	0.38	1.00
I Factor			1.000			1.000		1.000	
AT or PVG			3	3		3	3	3	3
Pltn Ratio			1.00	1.00		1.00	1.00	1.00	1.00
PF2			1.00	1.00		1.00		1.00	
Q1			5.2	6.6		3.3		5.8	
kB			0.4	0.4		0.4	0.7	0.4	0.7
Q2			0.6	1.1		0.3	0.5	0.7	1.3
Q Average			5.7	7.7		3.5		6.4	
Q Spacing			25.0	25.0		25.0	25.0	25.0	25.0
Q Storage			0	0		0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%			1.2	1.2		1.2		1.2	
BOQ			6.8	9.1		4.2		7.6	
QSRatio									
85th Percentile Output:									
fB%			1.5	1.5		1.6		1.5	
BOQ			8.9	11.8		5.5		9.9	
QSRatio									
90th Percentile Output:									
fB%			1.7	1.7		1.7		1.7	
BOQ			9.8	12.8		6.1		10.9	
QSRatio									
95th Percentile Output:									
fB%			1.9	1.9		2.0		1.9	
BOQ			11.1	14.5		7.0		12.3	
QSRatio									
98th Percentile Output:									
fB%			2.3	2.3		2.5		2.3	
BOQ			13.5	17.3		8.7		14.8	
QSRatio									

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-405 NB Ramps

Inter.: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Volume				534		770		1888	429		1039	672
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right	A	A		
Peds					Peds				
NB Right		A			EB Right				
SB Right		A			WB Right				
Green		43.0	0.0			8.3	22.1	0.0	
Yellow		4.3				4.3	3.6		
All Red		3.5				3.5	2.5		

Cycle Length: 95.1 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1554	3437	0.36	0.45	17.2	B		
							67.6	E
R	716	1583	1.13	0.45	102.5	F		
Northbound								
T	2038	5074	0.97	0.40	42.5	D	34.6	C
R	1583	1583	0.29	1.00	0.1	A		
Southbound								
T	2038	5074	0.54	0.40	22.0	C	13.4	B
R	1583	1583	0.45	1.00	0.2	A		

Intersection Delay = 35.9 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Culver at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-405 NB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				534		770		1888	429		1039	672
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				141		203		497	113		273	177
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				562		811		1987	452		1094	707
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		43.0	0.0			8.3	22.1	0.0
Yellow		4.3				4.3	3.6	
All Red		3.5				3.5	2.5	

Cycle Length: 95.1 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				534		770		1888	429		1039	672
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				562		811		1987	452		1094	707
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
Lane group				L		R		T	R		T	R
Adj flow				562		811		1987	452		1094	707
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T	R		T	R	
So			1900		1900		1900	1900		1900	1900	
Lanes	0	0	2	0	1	0	3	1	0	3	1	
fW			1.000		1.000		1.000	1.000		1.000	1.000	
fHV			0.980		0.980		0.980	0.980		0.980	0.980	
fG			1.000		1.000		1.000	1.000		1.000	1.000	
fP			1.000		1.000		1.000	1.000		1.000	1.000	
fBB			1.000		1.000		1.000	1.000		1.000	1.000	
fA			1.000		1.000		1.000	1.000		1.000	1.000	
fLU			0.971		1.000		0.908	1.000		0.908	1.000	
fRT					0.850		1.000	0.850		1.000	0.850	
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000	1.000		1.000	1.000	
S			3437		1583		5074	1583		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group		Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru									
Right									
Westbound									
Prot									
Perm									
Left	L		562	3437		0.16	0.45	1554	0.36
Prot									
Perm									
Thru									
Right	R		811	1583	#	0.51	0.45	716	1.13
Northbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru	T		1987	5074	#	0.39	0.40	2038	0.97
Right	R		452	1583		0.29	1.00	1583	0.29
Southbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru	T		1094	5074		0.22	0.40	2038	0.54
Right	R		707	1583		0.45	1.00	1583	0.45

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.90
Total lost time per cycle, L = 13.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.06

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.36	0.45	17.1	1.000	1554	0.11	0.1	0.0	17.2	B		
											67.6	E
R	1.13	0.45	26.0	1.000	716	0.50	76.5	0.0	102.5	F		
Northbound												
T	0.97	0.40	28.0	1.000	2038	0.48	14.5	0.0	42.5	D	34.6	C
R	0.29	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.54	0.40	21.7	1.000	2038	0.14	0.3	0.0	22.0	C	13.4	B
R	0.45	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 35.9 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.1 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.1 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT				0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.1 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	26.0	17.1	0.00	0.0	0.0	17.2
	0.0						0.0	
R	0.0	0.00	26.0	26.0	0.00	23.8	0.0	102.5
Northbound								
	0.0						0.0	
T	0.0	0.00	28.4	28.0	0.00	0.0	0.0	42.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	28.4	21.7	0.00	0.0	0.0	22.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 35.9 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				289	811	729	452	401	707
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	0 1	0 3	1	0 3	1
SL				1770	1583	1862	1583	1862	1583
LnCapacity				800	716	748	1583	748	1583
Flow Ratio				0.2	0.5	0.4	0.3	0.2	0.4
v/c Ratio				0.36	1.13	0.97	0.29	0.54	0.45
Grn Ratio				0.45	0.45	0.40	1.00	0.40	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00		1.00	
Q1				5.0	21.4	18.9		8.1	
kB				0.6	0.6	0.6	0.9	0.6	0.9
Q2				0.4	15.7	6.3	0.4	0.7	0.8
Q Average				5.3	37.1	25.2		8.8	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2	1.1	1.2		1.2	
BOQ				6.4	42.3	29.1		10.3	
QSRatio									
85th Percentile Output:									
fB%				1.6	1.4	1.4		1.5	
BOQ				8.3	51.4	36.1		13.3	
QSRatio									
90th Percentile Output:									
fB%				1.7	1.5	1.5		1.7	
BOQ				9.1	54.2	38.2		14.5	
QSRatio									
95th Percentile Output:									
fB%				1.9	1.6	1.6		1.9	
BOQ				10.4	58.5	41.6		16.4	
QSRatio									
98th Percentile Output:									
fB%				2.4	1.8	1.8		2.2	
BOQ				12.6	65.2	46.5		19.4	
QSRatio									

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-405 SB Ramps

Inter.: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	316	0	551					994	257		1544	251
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	P				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	23.9	0.0				4.6	11.8	0.0	
Yellow	3.6					4.3	4.3		
All Red	2.5					2.5	2.5		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	705	1770	0.47	0.40	13.9	B		
LTR	742	1863	0.00	0.40	10.9	B	27.8	C
R	631	1583	0.92	0.40	35.9	D		
Westbound								
Northbound								
T	1962	5074	0.53	0.39	14.5	B	11.5	B
R	1583	1583	0.17	1.00	0.1	A		
Southbound								
T	1962	5074	0.83	0.39	19.7	B	17.0	B
R	1583	1583	0.17	1.00	0.1	A		

Intersection Delay = 17.6 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Culver at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-405 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	316	0	551					994	257		1544	251
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	83	0	145					262	68		406	66
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	333	0	580					1046	271		1625	264
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	P				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	23.9	0.0			4.6	11.8	0.0	
Yellow	3.6				4.3	4.3		
All Red	2.5				2.5	2.5		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	316	0	551					994	257		1544	251
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	333	0	580					1046	271		1625	264
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	333	0	580					1046	271		1625	264
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound				Northbound			Southbound	
LG	L	LTR	R					T	R		T	R
So	1900	1900	1900					1900	1900		1900	1900
Lanes	1	1	1	0	0	0	0	3	1	0	3	1
fW	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980					0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fLU	1.000	1.000	1.000					0.908	1.000		0.908	1.000
fRT		1.000	0.850					1.000	0.850		1.000	0.850
fLT	0.950	1.000						1.000			1.000	
Sec.												
fLpb	1.000	1.000						1.000			1.000	
fRpb		1.000	1.000					1.000	1.000		1.000	1.000
S	1770	1863	1583					5074	1583		5074	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	333	1770		0.19	0.40	705	0.47
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.40	742	0.00
Right	R	580	1583	#	0.37	0.40	631	0.92
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1046	5074		0.21	0.39	1962	0.53
Right	R	271	1583		0.17	1.00	1583	0.17
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1625	5074	#	0.32	0.39	1962	0.83
Right	R	264	1583		0.17	1.00	1583	0.17

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.69
Total lost time per cycle, L = 12.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.87

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.47	0.40	13.4	1.000	705	0.11	0.5	0.0	13.9	B		
LTR	0.00	0.40	10.9	1.000	742	0.50	0.0	0.0	10.9	B	27.8	C
R	0.92	0.40	17.1	1.000	631	0.44	18.7	0.0	35.9	D		
Westbound												
Northbound												
T	0.53	0.39	14.2	1.000	1962	0.14	0.3	0.0	14.5	B	11.5	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.83	0.39	16.6	1.000	1962	0.37	3.1	0.0	19.7	B	17.0	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 17.6 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	18.0	13.4	0.00	0.0	0.0	13.9

LTR	0.0	0.00	18.0	10.9	0.00	0.0	0.0	10.9
R	0.0	0.00	18.0	17.1	0.00	0.0	0.0	35.9
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	18.4	14.2	0.00	0.0	0.0	14.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	18.4	16.6	0.00	0.0	0.0	19.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 17.6 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	333	0	580				383	271		596	264	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	3	1	0	3	1	
SL	1770	1863	1583				1862	1583		1862	1583	
LnCapacity	705	742	631				720	1583		720	1583	
Flow Ratio	0.2	0.0	0.4				0.2	0.2		0.3	0.2	
v/c Ratio	0.47	0.00	0.92				0.53	0.17		0.83	0.17	
Grn Ratio	0.40	0.40	0.40				0.39	1.00		0.39	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	4.1	0.0	9.2				4.9			9.0		
kB	0.4	0.7	0.4				0.4	0.7		0.4	0.7	
Q2	0.4	0.0	3.1				0.5	0.1		1.9	0.1	
Q Average	4.5	0.0	12.3				5.4			10.9		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.3	1.2				1.2			1.2		
BOQ	5.4	0.0	14.4				6.4			12.8		
QSRatio												
85th Percentile Output:												
fB%	1.6	1.7	1.5				1.6			1.5		
BOQ	7.0	0.0	18.4				8.4			16.4		
QSRatio												
90th Percentile Output:												
fB%	1.7	2.0	1.6				1.7			1.6		
BOQ	7.7	0.0	19.9				9.3			17.7		
QSRatio												
95th Percentile Output:												
fB%	2.0	2.6	1.8				1.9			1.8		
BOQ	8.9	0.0	22.2				10.6			19.9		
QSRatio												
98th Percentile Output:												
fB%	2.4	3.2	2.1				2.4			2.1		
BOQ	10.8	0.0	25.7				12.8			23.2		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-405 SB Ramps

Inter.: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	928	0	526					1426	550		1184	306
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	P				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	41.5	0.0				13.4	5.4	0.0	
Yellow	3.6					4.3	4.3		
All Red	2.5					2.5	2.5		

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	918	1770	1.06	0.52	67.6	E		
LTR	966	1863	0.00	0.52	9.3	A	49.1	D
R	821	1583	0.67	0.52	16.5	B		
Westbound								
Northbound								
T	1624	5074	0.92	0.32	35.6	D	25.7	C
R	1583	1583	0.37	1.00	0.1	A		
Southbound								
T	1624	5074	0.77	0.32	26.8	C	21.3	C
R	1583	1583	0.20	1.00	0.1	A		

Intersection Delay = 31.3 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Culver at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-405 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	928	0	526					1426	550		1184	306
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	244	0	138					375	145		312	81
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	977	0	554					1501	579		1246	322
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	P				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	41.5	0.0			13.4	5.4	0.0	
Yellow	3.6				4.3	4.3		
All Red	2.5				2.5	2.5		

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	928	0	526					1426	550		1184	306
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	977	0	554					1501	579		1246	322
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	977	0	554					1501	579		1246	322
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound							Northbound							Southbound						
LG	L		LTR	R											T	R						T	R				
So	1900		1900	1900											1900	1900						1900	1900				
Lanes	1		1		0		0		0		0				3	1		0				3	1				
fW	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fHV	0.980		0.980	0.980											0.980	0.980						0.980	0.980				
fG	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fP	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fBB	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fA	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fLU	1.000		1.000	1.000											0.908	1.000						0.908	1.000				
fRT			1.000	0.850											1.000	0.850						1.000	0.850				
fLT	0.950		1.000												1.000							1.000					
Sec.																											
fLpb	1.000		1.000												1.000							1.000					
fRpb			1.000	1.000											1.000	1.000						1.000	1.000				
S	1770		1863	1583											5074	1583						5074	1583				
Sec.																											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	977	1770	#	0.55	0.52	918	1.06
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.52	966	0.00
Right	R	554	1583		0.35	0.52	821	0.67
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1501	5074	#	0.30	0.32	1624	0.92
Right	R	579	1583		0.37	1.00	1583	0.37
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1246	5074		0.25	0.32	1624	0.77
Right	R	322	1583		0.20	1.00	1583	0.20

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.85
Total lost time per cycle, L = 12.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.01

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.06	0.52	19.3	1.000	918	0.50	48.3	0.0	67.6	E		
LTR	0.00	0.52	9.3	1.000	966	0.50	0.0	0.0	9.3	A	49.1	D
R	0.67	0.52	14.3	1.000	821	0.25	2.2	0.0	16.5	B		
Westbound												
Northbound												
T	0.92	0.32	26.3	1.000	1624	0.44	9.4	0.0	35.6	D	25.7	C
R	0.37	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.77	0.32	24.5	1.000	1624	0.32	2.3	0.0	26.8	C	21.3	C
R	0.20	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 31.3 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	19.3	19.3	0.00	14.7	0.0	67.6

LTR	0.0	0.00	19.3	9.3	0.00	0.0	0.0	9.3
R	0.0	0.00	19.3	14.3	0.00	0.0	0.0	16.5
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	27.2	26.3	0.00	0.0	0.0	35.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	27.2	24.5	0.00	0.0	0.0	26.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 31.3 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	977	0	554				551	579		457	322	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	3	1	0	3	1	
SL	1770	1863	1583				1862	1583		1862	1583	
LnCapacity	918	966	821				596	1583		596	1583	
Flow Ratio	0.6	0.0	0.3				0.3	0.4		0.2	0.2	
v/c Ratio	1.06	0.00	0.67				0.92	0.37		0.77	0.20	
Grn Ratio	0.52	0.52	0.52				0.32	1.00		0.32	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	21.7	0.0	9.1				11.8			9.2		
kB	0.6	1.0	0.6				0.5	0.8		0.5	0.8	
Q2	13.1	0.0	1.1				3.5	0.5		1.4	0.2	
Q Average	34.8	0.0	10.3				15.4			10.6		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.3	1.2				1.2			1.2		
BOQ	39.7	0.0	12.1				17.9			12.5		
QSRatio												
85th Percentile Output:												
fB%	1.4	1.7	1.5				1.5			1.5		
BOQ	48.5	0.0	15.5				22.7			16.0		
QSRatio												
90th Percentile Output:												
fB%	1.5	2.0	1.6				1.6			1.6		
BOQ	51.1	0.0	16.8				24.4			17.3		
QSRatio												
95th Percentile Output:												
fB%	1.6	2.6	1.8				1.8			1.8		
BOQ	55.2	0.0	18.9				27.0			19.4		
QSRatio												
98th Percentile Output:												
fB%	1.8	3.2	2.2				2.0			2.1		
BOQ	61.5	0.0	22.1				30.8			22.7		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-405 NB Ramps

Inter.: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Volume				1457		922		1903	607		1950	1841
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left	A				SB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right	A	A		
Green	24.4	0.0				11.4	16.2	0.0	
Yellow	3.6					4.7	4.7		
All Red	2.0					1.5	1.5		

Cycle Length: 70.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1680	4820	0.91	0.35	29.9	C		
							18.6	B
R	1583	1583	0.61	1.00	0.7	A		
Northbound								
T	2450	5074	0.82	0.48	17.8	B	13.5	B
R	1583	1583	0.40	1.00	0.2	A		
Southbound								
T	3267	6765	0.63	0.48	13.8	B	59.0	E
R	1583	1583	1.22	1.00	106.8	F		

Intersection Delay = 34.7 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Jamboree at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-405 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1457	922			1903	607		1950	1841
% Heavy Veh				2	2			2	2		2	2
PHF				0.95	0.95			0.95	0.95		0.95	0.95
PK 15 Vol				383	243			501	160		513	484
Hi Ln Vol												
% Grade				0				0			0	
Ideal Sat				1900	1900			1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				1534		971		2003	639		2053	1938
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right	A	A	
Green		24.4	0.0			11.4	16.2	0.0
Yellow		3.6				4.7	4.7	
All Red		2.0				1.5	1.5	

Cycle Length: 70.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1457	922			1903	607		1950	1841
PHF				0.95	0.95			0.95	0.95		0.95	0.95
Adj flow				1534	971			2003	639		2053	1938
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
Lane group				L		R		T	R		T	R
Adj flow				1534		971		2003	639		2053	1938
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T	R		T	R	
So			1900		1900		1900	1900		1900	1900	
Lanes	0	0	3	0	1	0	3	1	0	4	1	
fW			1.000		1.000		1.000	1.000		1.000	1.000	
fHV			0.980		0.980		0.980	0.980		0.980	0.980	
fG			1.000		1.000		1.000	1.000		1.000	1.000	
fP			1.000		1.000		1.000	1.000		1.000	1.000	
fBB			1.000		1.000		1.000	1.000		1.000	1.000	
fA			1.000		1.000		1.000	1.000		1.000	1.000	
fLU			0.908		1.000		0.908	1.000		0.908	1.000	
fRT					0.850		1.000	0.850		1.000	0.850	
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000	1.000		1.000	1.000	
S			4820		1583		5074	1583		6765	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Westbound							
Prot							
Perm							
Left	L	1534	4820	0.32	0.35	1680	0.91
Prot							
Perm							
Thru							
Right	R	971	1583	0.61	1.00	1583	0.61
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	2003	5074	0.39	0.48	2450	0.82
Right	R	639	1583	0.40	1.00	1583	0.40
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	2053	6765	0.30	0.48	3267	0.63
Right	R	1938	1583	# 1.22	1.00	1583	1.22

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.22
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.22

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
Westbound												
L	0.91	0.35	21.8	1.000	1680	0.43	8.1	0.0	29.9	C		
											18.6	B
R	0.61	1.00	0.0	0.950	1583	0.20	0.7	0.0	0.7	A		
Northbound												
T	0.82	0.48	15.5	1.000	2450	0.36	2.3	0.0	17.8	B	13.5	B
R	0.40	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.63	0.48	13.4	1.000	3267	0.21	0.4	0.0	13.8	B	59.0	E
R	1.22	1.00	0.0	0.950	1583	0.50	106.8	0.0	106.8	F		

Intersection delay = 34.7 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	70.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	70.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT				0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					

EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	70.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	22.8	21.8	0.00	0.0	0.0	29.9
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.7
Northbound								
	0.0						0.0	
T	0.0	0.00	18.1	15.5	0.00	0.0	0.0	17.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	18.1	13.4	0.00	0.0	0.0	13.8
R	0.0	0.00	0.0	0.0	0.00	88.7	0.0	106.8

Intersection Delay 34.7 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup			L	R		T	R	T	R
Init Queue			0.0	0.0		0.0	0.0	0.0	0.0
Flow Rate			563	971		735	639	565	1938
So			1900	1900		1900	1900	1900	1900
No.Lanes	0	0 0	3	0 1	0	3	1	0 4	1
SL			1769	1583		1862	1583	1862	1583
LnCapacity			616	1583		899	1583	899	1583
Flow Ratio			0.3	0.6		0.4	0.4	0.3	1.2
v/c Ratio			0.91	0.61		0.82	0.40	0.63	1.22
Grn Ratio			0.35	1.00		0.48	1.00	0.48	1.00
I Factor			1.000			1.000		1.000	
AT or PVG			3	3		3	3	3	3
Pltn Ratio			1.00	1.00		1.00	1.00	1.00	1.00
PF2			1.00			1.00		1.00	
Q1			10.5			12.2		8.2	
kB			0.4	0.8		0.6	0.8	0.6	0.8
Q2			3.2	1.2		2.2	0.5	0.9	48.3
Q Average			13.7			14.5		9.1	
Q Spacing			25.0	25.0		25.0	25.0	25.0	25.0
Q Storage			0	0		0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%			1.2			1.2		1.2	
BOQ			16.0			16.9		10.7	
QSRatio									
85th Percentile Output:									
fB%			1.5			1.5		1.5	
BOQ			20.3			21.5		13.8	
QSRatio									
90th Percentile Output:									
fB%			1.6			1.6		1.7	
BOQ			21.9			23.1		15.0	
QSRatio									
95th Percentile Output:									
fB%			1.8			1.8		1.9	
BOQ			24.3			25.6		16.9	
QSRatio									
98th Percentile Output:									
fB%			2.0			2.0		2.2	
BOQ			28.0			29.3		19.9	
QSRatio									

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-405 NB Ramps

Inter.: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Volume				733		268		3691	1099		2511	1232
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right	A	A	
Green	20.0	0.0				28.9	63.0	0.0
Yellow	3.6					4.7	4.7	
All Red	2.0					1.5	1.5	

Cycle Length: 129.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	742	4820	1.04	0.15	99.0	F		
							72.5	E
R	1583	1583	0.18	1.00	0.1	A		
Northbound								
T	3832	5074	1.01	0.76	34.0	C	26.6	C
R	1583	1583	0.73	1.00	1.8	A		
Southbound								
T	5109	6765	0.52	0.76	6.5	A	5.5	A
R	1583	1583	0.82	1.00	3.5	A		

Intersection Delay = 23.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: PM
Intersection: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2008
Project ID: IBC Vision Traffic Study - Existing With Project

E/W St: I-405 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				733	268			3691	1099		2511	1232
% Heavy Veh				2	2			2	2		2	2
PHF				0.95	0.95			0.95	0.95		0.95	0.95
PK 15 Vol				193	71			971	289		661	324
Hi Ln Vol												
% Grade				0				0			0	
Ideal Sat				1900	1900			1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				772	282			3885	1157		2643	1297
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right	A	A	
Green		20.0	0.0			28.9	63.0	0.0
Yellow		3.6				4.7	4.7	
All Red		2.0				1.5	1.5	

Cycle Length: 129.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				733	268			3691	1099		2511	1232
PHF				0.95	0.95			0.95	0.95		0.95	0.95
Adj flow				772	282			3885	1157		2643	1297
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
Lane group				L		R		T	R		T	R
Adj flow				772	282			3885	1157		2643	1297
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T	R		T	R	
So			1900		1900		1900	1900		1900	1900	
Lanes	0	0	3	0	1	0	3	1	0	4	1	
fW			1.000		1.000		1.000	1.000		1.000	1.000	
fHV			0.980		0.980		0.980	0.980		0.980	0.980	
fG			1.000		1.000		1.000	1.000		1.000	1.000	
fP			1.000		1.000		1.000	1.000		1.000	1.000	
fBB			1.000		1.000		1.000	1.000		1.000	1.000	
fA			1.000		1.000		1.000	1.000		1.000	1.000	
fLU			0.908		1.000		0.908	1.000		0.908	1.000	
fRT					0.850		1.000	0.850		1.000	0.850	
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000	1.000		1.000	1.000	
S			4820		1583		5074	1583		6765	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	772	4820	#	0.16	0.15	742	1.04
Prot								
Perm								
Thru								
Right	R	282	1583		0.18	1.00	1583	0.18
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	3885	5074	#	0.77	0.76	3832	1.01
Right	R	1157	1583		0.73	1.00	1583	0.73
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2643	6765		0.39	0.76	5109	0.52
Right	R	1297	1583		0.82	1.00	1583	0.82

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.93
Total lost time per cycle, L = 11.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.02

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.04	0.15	54.9	1.000	742	0.50	44.0	0.0	99.0	F		
											72.5	E
R	0.18	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Northbound												
T	1.01	0.76	15.9	1.000	3832	0.50	18.1	0.0	34.0	C	26.6	C
R	0.73	1.00	0.0	0.950	1583	0.29	1.8	0.0	1.8	A		
Southbound												

T	0.52	0.76	6.4	1.000	5109	0.12	0.1	0.0	6.5	A	5.5	A
R	0.82	1.00	0.0	0.950	1583	0.36	3.5	0.0	3.5	A		

Intersection delay = 23.1 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 129.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 129.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	129.9 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	54.9	54.9	0.00	7.5	0.0	99.0
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Northbound								
	0.0						0.0	
T	0.0	0.00	15.9	15.9	0.00	13.3	0.0	34.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.8
Southbound								
	0.0						0.0	
T	0.0	0.00	15.9	6.4	0.00	0.0	0.0	6.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	3.5

Intersection Delay 23.1 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound		Northbound		Southbound	
LaneGroup		L	R	T	R	T	R
Init Queue		0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate		283	282	1426	1157	727	1297
So		1900	1900	1900	1900	1900	1900
No.Lanes	0 0 0	3 0	1	0 3	1	0 4	1
SL		1769	1583	1862	1583	1862	1583
LnCapacity		272	1583	1406	1583	1406	1583
Flow Ratio		0.2	0.2	0.8	0.7	0.4	0.8
v/c Ratio		1.04	0.18	1.01	0.73	0.52	0.82
Grn Ratio		0.15	1.00	0.76	1.00	0.76	1.00
I Factor		1.000		1.000		1.000	
AT or PVG		3	3	3	3	3	3
Pltn Ratio		1.00	1.00	1.00	1.00	1.00	1.00
PF2		1.00		1.00		1.00	
Q1		10.2		51.5		10.5	
kB		0.4	1.1	1.1	1.1	1.1	1.1
Q2		4.5	0.2	15.0	2.9	1.1	4.6
Q Average		14.7		66.5		11.7	
Q Spacing		25.0	25.0	25.0	25.0	25.0	25.0
Q Storage		0	0	0	0	0	0
Q S Ratio							
70th Percentile Output:							
fB%		1.2		1.1		1.2	
BOQ		17.2		74.4		13.7	
QSRatio							
85th Percentile Output:							
fB%		1.5		1.3		1.5	
BOQ		21.8		88.6		17.5	
QSRatio							
90th Percentile Output:							
fB%		1.6		1.4		1.6	
BOQ		23.4		94.0		18.9	
QSRatio							
95th Percentile Output:							
fB%		1.8		1.5		1.8	
BOQ		25.9		101		21.1	
QSRatio							
98th Percentile Output:							
fB%		2.0		1.7		2.1	
BOQ		29.7		113		24.6	
QSRatio							

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-405 SB Ramps

Inter.: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Volume	827	0	1992					1670	570		3054	325
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	P				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	61.2	0.0				12.9	37.5	0.0
Yellow	3.5					4.7	4.7	
All Red	1.5					2.0	2.0	

Cycle Length: 130.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	833	1770	1.05	0.47	78.2	E		
LTR	877	1863	0.00	0.47	18.2	B	237.0	F
R	1320	2803	1.59	0.47	302.9	F		
Westbound								
Northbound								
T	2971	6765	0.59	0.44	27.9	C	20.9	C
R	1583	1583	0.38	1.00	0.2	A		
Southbound								
T	2971	6765	1.08	0.44	80.2	F	72.5	E
R	1583	1583	0.22	1.00	0.1	A		

Intersection Delay = 113.7 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Jamboree at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-405 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	827	0	1992					1670	570		3054	325
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	218	0	524					439	150		804	86
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L		LTR R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	871	0	2097					1758	600		3215	342
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	P				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	61.2	0.0			12.9	37.5	0.0	
Yellow	3.5				4.7	4.7		
All Red	1.5				2.0	2.0		

Cycle Length: 130.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	827	0	1992					1670	570		3054	325
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	871	0	2097					1758	600		3215	342
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
Lane group	L		LTR R					T	R		T	R
Adj flow	871	0	2097					1758	600		3215	342
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound							Northbound							Southbound						
LG	L		LTR	R											T		R					T		R			
So	1900		1900	1900											1900		1900					1900		1900			
Lanes	1		1	2		0		0		0		0			4		1		0			4		1			
fW	1.000		1.000	1.000											1.000		1.000					1.000		1.000			
fHV	0.980		0.980	0.980											0.980		0.980					0.980		0.980			
fG	1.000		1.000	1.000											1.000		1.000					1.000		1.000			
fP	1.000		1.000	1.000											1.000		1.000					1.000		1.000			
fBB	1.000		1.000	1.000											1.000		1.000					1.000		1.000			
fA	1.000		1.000	1.000											1.000		1.000					1.000		1.000			
fLU	1.000		1.000	0.885											0.908		1.000					0.908		1.000			
fRT			1.000	0.850											1.000		0.850					1.000		0.850			
fLT	0.950		1.000												1.000							1.000						
Sec.																												
fLpb	1.000		1.000												1.000							1.000						
fRpb			1.000	1.000											1.000		1.000					1.000		1.000			
S	1770		1863	2803											6765		1583					6765		1583			
Sec.																												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	871	1770		0.49	0.47	833	1.05
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.47	877	0.00
Right	R	2097	2803	#	0.75	0.47	1320	1.59
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1758	6765		0.26	0.44	2971	0.59
Right	R	600	1583		0.38	1.00	1583	0.38
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	3215	6765	#	0.48	0.44	2971	1.08
Right	R	342	1583		0.22	1.00	1583	0.22

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.22
Total lost time per cycle, L = 11.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.34

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.05	0.47	34.4	1.000	833	0.50	43.8	0.0	78.2	E		
LTR	0.00	0.47	18.2	1.000	877	0.50	0.0	0.0	18.2	B	237.0	F
R	1.59	0.47	34.4	1.000	1320	0.50	268.5	0.0	302.9	F		
Westbound												
Northbound												
T	0.59	0.44	27.6	1.000	2971	0.18	0.3	0.0	27.9	C	20.9	C
R	0.38	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	1.08	0.44	36.5	1.000	2971	0.50	43.7	0.0	80.2	F	72.5	E
R	0.22	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 113.7 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	130.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	130.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	130.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	34.4	34.4	0.00	9.5	0.0	78.2

LTR	0.0	0.00	34.4	18.2	0.00	0.0	0.0	18.2
R	0.0	0.00	34.4	34.4	0.00	194.3	0.0	302.9
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	36.5	27.6	0.00	0.0	0.0	27.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	36.5	36.5	0.00	61.0	0.0	80.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 113.7 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	871	0	1184				484	600		885	342	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	2	0	0	0	0	4	1	0	4	1
SL	1770	1863	1584				1862	1583		1862	1583	
LnCapacity	833	877	745				818	1583		818	1583	
Flow Ratio	0.5	0.0	0.7				0.3	0.4		0.5	0.2	
v/c Ratio	1.05	0.00	1.59				0.59	0.38		1.08	0.22	
Grn Ratio	0.47	0.47	0.47				0.44	1.00		0.44	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	31.5	0.0	42.8				13.2			32.0		
kB	0.8	1.3	0.7				0.8	1.1		0.8	1.1	
Q2	11.8	0.0	56.8				1.1	0.7		14.3	0.3	
Q Average	43.3	0.0	99.5				14.3			46.2		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.3	1.1				1.2			1.1		
BOQ	49.1	0.0	110				16.8			52.3		
QSRatio												
85th Percentile Output:												
fB%	1.4	1.7	1.3				1.5			1.4		
BOQ	59.3	0.0	130				21.3			63.1		
QSRatio												
90th Percentile Output:												
fB%	1.4	2.0	1.4				1.6			1.4		
BOQ	62.6	0.0	140				22.8			66.6		
QSRatio												
95th Percentile Output:												
fB%	1.6	2.6	1.5				1.8			1.5		
BOQ	67.3	0.0	150				25.4			71.5		
QSRatio												
98th Percentile Output:												
fB%	1.7	3.2	1.7				2.0			1.7		
BOQ	75.1	0.0	169				29.1			79.9		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-405 SB Ramps

Inter.: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Volume	1510	0	1210					3193	1089		2737	662
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	P				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	58.6	0.0				12.7	40.3	0.0
Yellow	3.5					4.7	4.7	
All Red	1.5					2.0	2.0	

Cycle Length: 130.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	798	1770	1.99	0.45	486.2	F		
LTR	840	1863	0.00	0.45	19.6	B	297.9	F
R	1264	2803	1.01	0.45	63.0	E		
Westbound								
Northbound								
T	3107	6765	1.08	0.46	78.5	E	58.9	E
R	1583	1583	0.72	1.00	1.7	A		
Southbound								
T	3107	6765	0.93	0.46	38.7	D	31.2	C
R	1583	1583	0.44	1.00	0.2	A		

Intersection Delay = 112.4 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Jamboree at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-405 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	1510	0	1210					3193	1089		2737	662
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	397	0	318					840	287		720	174
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L		LTR R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	1589	0	1274					3361	1146		2881	697
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	P				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	58.6	0.0			12.7	40.3	0.0	
Yellow	3.5				4.7	4.7		
All Red	1.5				2.0	2.0		

Cycle Length: 130.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	1510	0	1210					3193	1089		2737	662
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	1589	0	1274					3361	1146		2881	697
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
Lane group	L		LTR R					T	R		T	R
Adj flow	1589	0	1274					3361	1146		2881	697
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound				Northbound			Southbound	
LG	L		LTR	R								T	R		T	R
So	1900		1900	1900								1900	1900		1900	1900
Lanes	1		1	2	0	0	0	0				4	1	0	4	1
fW	1.000		1.000	1.000								1.000	1.000		1.000	1.000
fHV	0.980		0.980	0.980								0.980	0.980		0.980	0.980
fG	1.000		1.000	1.000								1.000	1.000		1.000	1.000
fP	1.000		1.000	1.000								1.000	1.000		1.000	1.000
fBB	1.000		1.000	1.000								1.000	1.000		1.000	1.000
fA	1.000		1.000	1.000								1.000	1.000		1.000	1.000
fLU	1.000		1.000	0.885								0.908	1.000		0.908	1.000
fRT			1.000	0.850								1.000	0.850		1.000	0.850
fLT	0.950		1.000									1.000			1.000	
Sec.																
fLpb	1.000		1.000									1.000			1.000	
fRpb			1.000	1.000								1.000	1.000		1.000	1.000
S	1770		1863	2803								6765	1583		6765	1583
Sec.																

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	1589	1770	#	0.90	0.45	798	1.99
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.45	840	0.00
Right	R	1274	2803		0.45	0.45	1264	1.01
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	3361	6765	#	0.50	0.46	3107	1.08
Right	R	1146	1583		0.72	1.00	1583	0.72
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2881	6765		0.43	0.46	3107	0.93
Right	R	697	1583		0.44	1.00	1583	0.44

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.39
Total lost time per cycle, L = 11.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.53

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.99	0.45	35.7	1.000	798	0.50	450.5	0.0	486.2	F		
LTR	0.00	0.45	19.6	1.000	840	0.50	0.0	0.0	19.6	B	297.9	F
R	1.01	0.45	35.7	1.000	1264	0.50	27.3	0.0	63.0	E		
Westbound												
Northbound												
T	1.08	0.46	35.1	1.000	3107	0.50	43.3	0.0	78.5	E	58.9	E
R	0.72	1.00	0.0	0.950	1583	0.28	1.7	0.0	1.7	A		
Southbound												

T	0.93	0.46	33.1	1.000	3107	0.44	5.6	0.0	38.7	D	31.2	C
R	0.44	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 112.4 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 130.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 130.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	130.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	35.7	35.7	0.00	197.8	0.0	486.2

LTR	0.0	0.00	35.7	19.6	0.00	0.0	0.0	19.6
R	0.0	0.00	35.7	35.7	0.00	2.5	0.0	63.0
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	35.1	35.1	0.00	63.5	0.0	78.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.7
Southbound								
	0.0						0.0	
T	0.0	0.00	35.1	33.1	0.00	0.0	0.0	38.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 112.4 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	1589	0	719				925	1146		793	697	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	2	0	0	0	4	1	0	4	1	
SL	1770	1863	1584				1862	1583		1862	1583	
LnCapacity	798	840	714				855	1583		855	1583	
Flow Ratio	0.9	0.0	0.5				0.5	0.7		0.4	0.4	
v/c Ratio	1.99	0.00	1.01				1.08	0.72		0.93	0.44	
Grn Ratio	0.45	0.45	0.45				0.46	1.00		0.46	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	57.4	0.0	26.0				33.4			27.0		
kB	0.8	1.3	0.7				0.8	1.1		0.8	1.1	
Q2	100.4		0.0	8.3				14.8	2.8		5.7	
Q Average	157.7		0.0	34.2				48.3			32.7	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.3	1.1				1.1			1.1		
BOQ	174	0.0	39.1				54.5			37.4		
QSRatio												
85th Percentile Output:												
fB%	1.3	1.7	1.4				1.4			1.4		
BOQ	205	0.0	47.8				65.6			45.8		
QSRatio												
90th Percentile Output:												
fB%	1.4	2.0	1.5				1.4			1.5		
BOQ	221	0.0	50.4				69.3			48.4		
QSRatio												
95th Percentile Output:												
fB%	1.5	2.6	1.6				1.5			1.6		
BOQ	237	0.0	54.4				74.4			52.3		
QSRatio												
98th Percentile Output:												
fB%	1.7	3.2	1.8				1.7			1.8		
BOQ	268	0.0	60.7				83.2			58.3		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Volume				939		725		2263	365	209	1190	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	23.2	0.0			5.6	11.7	11.1	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 75.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1063	3437	0.93	0.31	38.9	D		
							37.2	D
R	867	2803	0.88	0.31	35.0-	C		
Northbound								
T	2625	6765	0.91	0.39	26.8	C	25.4	C
R	1088	2803	0.35	0.39	16.5	B		
Southbound								
L	257	3437	0.86	0.07	58.0	E		
T	3599	6765	0.35	0.53	10.1	B	17.3	B

Intersection Delay = 26.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: AM
Intersection: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2008
Project ID: IBC Vision Traffic Study - Existing With Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				939		725		2263	365	209	1190	
% Heavy Veh				2		2		2	2	2	2	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol				247		191		596	96	55	313	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	0	0		2	0	2	0	4	2	2	4	0
LGConfig				L			R		T	R	L	T	
Lane Width				12.0			12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0				0			
Adj Flow				988		763		2382	384		220	1253	
%InSharedLn													
Prop LTs								0.000			0.000		
Prop RTs						1.000		0.000	1.000		0.000		
Peds Bikes	0			0				0					
Buses				0		0		0	0		0	0	
%InProtPhase													

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type				3		3		3	3	3	3	
Unit Ext.				3.0		3.0		3.0	3.0	3.0	3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g				2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	23.2	0.0			5.6	11.7	11.1	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 75.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				939		725		2263	365	209	1190	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow				988		763		2382	384	220	1253	
No. Lanes	0	0	0		2	0	2	0	4	2	2	4	0
Lane group				L			R		T	R	L	T	
Adj flow				988		763		2382	384		220	1253	
Prop LTs								0.000			0.000		
Prop RTs						1.000		0.000	1.000		0.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T	R	L	T		
So			1900		1900		1900	1900	1900	1900		
Lanes	0	0	2	0	2	0	4	2	2	4	0	
fW			1.000		1.000		1.000	1.000	1.000	1.000		
fHV			0.980		0.980		0.980	0.980	0.980	0.980		
fG			1.000		1.000		1.000	1.000	1.000	1.000		
fP			1.000		1.000		1.000	1.000	1.000	1.000		
fBB			1.000		1.000		1.000	1.000	1.000	1.000		
fA			1.000		1.000		1.000	1.000	1.000	1.000		
fLU			0.971		0.885		0.908	0.885	0.971	0.908		
fRT					0.850		1.000	0.850		1.000		
fLT			0.950				1.000		0.950	1.000		
Sec.												
fLpb			1.000				1.000		1.000	1.000		
fRpb					1.000		1.000	1.000		1.000		
S			3437		2803		6765	2803	3437	6765		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	988	3437	#	0.29	0.31	1063	0.93
Prot								
Perm								
Thru								
Right	R	763	2803		0.27	0.31	867	0.88
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2382	6765	#	0.35	0.39	2625	0.91
Right	R	384	2803		0.14	0.39	1088	0.35
Southbound								
Prot								
Perm								
Left	L	220	3437	#	0.06	0.07	257	0.86
Prot								
Perm								
Thru	T	1253	6765		0.19	0.53	3599	0.35
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.70
Total lost time per cycle, L = 17.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.91

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.93	0.31	25.1	1.000	1063	0.44	13.8	0.0	38.9	D		
											37.2	D
R	0.88	0.31	24.6	1.000	867	0.41	10.4	0.0	35.0-	C		
Northbound												
T	0.91	0.39	21.7	1.000	2625	0.43	5.1	0.0	26.8	C	25.4	C
R	0.35	0.39	16.3	1.000	1088	0.11	0.2	0.0	16.5	B		
Southbound												
L	0.86	0.07	34.3	1.000	257	0.39	23.7	0.0	58.0	E		

T	0.35	0.53	10.1	1.000	3599	0.11	0.1	0.0	10.1	B	17.3	B

Intersection delay = 26.8 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	75.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	25.9	25.1	0.00	0.0	0.0	38.9
	0.0						0.0	
R	0.0	0.00	25.9	24.6	0.00	0.0	0.0	35.0-
Northbound								
	0.0						0.0	
T	0.0	0.00	23.0	21.7	0.00	0.0	0.0	26.8
R	0.0	0.00	23.0	16.3	0.00	0.0	0.0	16.5
Southbound								
L	0.0	0.00	34.7	34.3	0.00	0.0	0.0	58.0
T	0.0	0.00	17.6	10.1	0.00	0.0	0.0	10.1
	0.0						0.0	

Intersection Delay 26.8 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup				L	R	T	R	L	T	
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate				508	431	655	216	113	344	
So				1900	1900	1900	1900	1900	1900	
No.Lanes	0	0	0	2	0 2	0 4	2	2	4	0
SL				1770	1584	1862	1584	1770	1862	
LnCapacity				547	489	722	614	132	990	
Flow Ratio				0.3	0.3	0.4	0.1	0.1	0.2	
v/c Ratio				0.93	0.88	0.91	0.35	0.86	0.35	
Grn Ratio				0.31	0.31	0.39	0.39	0.07	0.53	
I Factor				1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00	1.00	
Q1				10.3	8.5	12.9	3.2	2.3	4.1	
kB				0.4	0.4	0.5	0.5	0.2	0.6	
Q2				3.3	2.3	3.5	0.2	0.8	0.3	
Q Average				13.6	10.8	16.4	3.4	3.1	4.4	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage				0	0	0	0	0	0	
Q S Ratio										
70th Percentile Output:										
fB%				1.2	1.2	1.2	1.2	1.2	1.2	
BOQ				15.9	12.7	19.1	4.1	3.7	5.3	
QSRatio										
85th Percentile Output:										
fB%				1.5	1.5	1.5	1.6	1.6	1.6	
BOQ				20.3	16.3	24.2	5.4	4.9	6.9	
QSRatio										
90th Percentile Output:										
fB%				1.6	1.6	1.6	1.7	1.7	1.7	
BOQ				21.8	17.6	25.8	6.0	5.5	7.6	
QSRatio										
95th Percentile Output:										
fB%				1.8	1.8	1.7	2.0	2.0	2.0	
BOQ				24.2	19.8	28.5	6.9	6.3	8.7	
QSRatio										
98th Percentile Output:										
fB%				2.1	2.1	2.0	2.5	2.5	2.4	
BOQ				27.9	23.1	32.5	8.5	7.8	10.7	
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Volume				573		304		2000	1136	609	1697	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	17.1	0.0			19.4	30.6	4.5	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	619	3437	0.97	0.18	68.4	E		
							58.1	E
R	505	2803	0.63	0.18	38.7	D		
Northbound								
T	2948	6765	0.71	0.44	22.8	C	31.6	C
R	1222	2803	0.98	0.44	47.1	D		
Southbound								
L	702	3437	0.91	0.20	53.4	D		
T	4700	6765	0.38	0.69	6.1	A	18.6	B

Intersection Delay = 30.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Macarthur at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				573		304		2000	1136	609	1697	
% Heavy Veh				2		2		2	2	2	2	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol				151		80		526	299	160	447	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			
Adj Flow				603		320		2105	1196	641	1786	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000	0.000		
Peds Bikes	0			0			0					
Buses				0		0		0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type				3		3		3	3	3	3	
Unit Ext.				3.0		3.0		3.0	3.0	3.0	3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g				2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	17.1	0.0			19.4	30.6	4.5	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				573		304		2000	1136	609	1697	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow				603		320		2105	1196	641	1786	
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
Lane group				L		R		T	R	L	T	
Adj flow				603		320		2105	1196	641	1786	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000	0.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		L	T	
So				1900		1900	1900	1900		1900	1900	
Lanes	0	0	0	2	0	2	0 4	2		2	4	0
fW				1.000		1.000	1.000	1.000		1.000	1.000	
fHV				0.980		0.980	0.980	0.980		0.980	0.980	
fG				1.000		1.000	1.000	1.000		1.000	1.000	
fP				1.000		1.000	1.000	1.000		1.000	1.000	
fBB				1.000		1.000	1.000	1.000		1.000	1.000	
fA				1.000		1.000	1.000	1.000		1.000	1.000	
fLU				0.971		0.885	0.908	0.885		0.971	0.908	
fRT						0.850	1.000	0.850			1.000	
fLT				0.950			1.000			0.950	1.000	
Sec.												
fLpb				1.000			1.000			1.000	1.000	
fRpb						1.000	1.000	1.000			1.000	
S				3437		2803	6765	2803		3437	6765	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	603	3437	#	0.18	0.18	619	0.97
Prot								
Perm								
Thru								
Right	R	320	2803		0.11	0.18	505	0.63
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2105	6765		0.31	0.44	2948	0.71
Right	R	1196	2803	#	0.43	0.44	1222	0.98
Southbound								
Prot								
Perm								
Left	L	641	3437	#	0.19	0.20	702	0.91
Prot								
Perm								
Thru	T	1786	6765		0.26	0.69	4700	0.38
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.79
Total lost time per cycle, L = 17.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.96

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.97	0.18	38.7	1.000	619	0.48	29.6	0.0	68.4	E		
											58.1	E
R	0.63	0.18	36.1	1.000	505	0.21	2.6	0.0	38.7	D		
Northbound												
T	0.71	0.44	22.0	1.000	2948	0.28	0.8	0.0	22.8	C	31.6	C
R	0.98	0.44	26.4	1.000	1222	0.48	20.7	0.0	47.1	D		
Southbound												
L	0.91	0.20	37.0	1.000	702	0.43	16.4	0.0	53.4	D		

T 0.38 0.69 6.0 1.000 4700 0.11 0.1 0.0 6.1 A 18.6 B

Intersection delay = 30.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				

EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

			EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0	sec				
Adj. LT vol from Vol Adjustment Worksheet, v						
v/c ratio from Capacity Worksheet, X						
Protected phase effective green interval, g (s)						
Opposing queue effective green interval, gq						
Unopposed green interval, gu						
Red time r=(C-g-gq-gu)						
Arrival rate, qa=v/(3600(max[X,1.0]))						
Protected ph. departure rate, Sp=s/3600						
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)						
XPerm						
XProt						
Case						
Queue at beginning of green arrow, Qa						
Queue at beginning of unsaturated green, Qu						
Residual queue, Qr						
Uniform Delay, d1						

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	39.0	38.7	0.00	0.0	0.0	68.4
	0.0						0.0	
R	0.0	0.00	39.0	36.1	0.00	0.0	0.0	38.7
Northbound								
	0.0						0.0	
T	0.0	0.00	26.8	22.0	0.00	0.0	0.0	22.8
R	0.0	0.00	26.8	26.4	0.00	0.0	0.0	47.1
Southbound								
L	0.0	0.00	37.8	37.0	0.00	0.0	0.0	53.4
T	0.0	0.00	14.5	6.0	0.00	0.0	0.0	6.1
	0.0						0.0	

Intersection Delay 30.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	R		T	R		L	T	
Init Queue				0.0	0.0		0.0	0.0		0.0	0.0	
Flow Rate				310	180		579	675		330	491	
So				1900	1900		1900	1900		1900	1900	
No.Lanes	0	0	0	2	0 2		0 4	2		2	4	0
SL				1770	1584		1862	1584		1770	1862	
LnCapacity				318	285		811	690		361	1294	
Flow Ratio				0.2	0.1		0.3	0.4		0.2	0.3	
v/c Ratio				0.97	0.63		0.71	0.98		0.91	0.38	
Grn Ratio				0.18	0.18		0.44	0.44		0.20	0.69	
I Factor				1.000			1.000			1.000		
AT or PVG				3	3		3	3		3	3	
Pltn Ratio				1.00	1.00		1.00	1.00		1.00	1.00	
PF2				1.00	1.00		1.00	1.00		1.00	1.00	
Q1				8.1	4.4		12.5	17.5		8.5	5.4	
kB				0.4	0.3		0.6	0.6		0.4	0.8	
Q2				3.3	0.6		1.5	6.1		2.5	0.5	
Q Average				11.4	4.9		14.0	23.6		11.0	5.9	
Q Spacing				25.0	25.0		25.0	25.0		25.0	25.0	
Q Storage				0	0		0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.2	1.2		1.2	1.2		1.2	1.2	
BOQ				13.4	5.9		16.4	27.2		13.0	7.0	
QSRatio												
85th Percentile Output:												
fB%				1.5	1.6		1.5	1.4		1.5	1.5	
BOQ				17.2	7.7		20.8	33.9		16.6	9.1	
QSRatio												
90th Percentile Output:												
fB%				1.6	1.7		1.6	1.5		1.6	1.7	
BOQ				18.5	8.5		22.4	35.9		18.0	10.0	
QSRatio												
95th Percentile Output:												
fB%				1.8	2.0		1.8	1.7		1.8	1.9	
BOQ				20.7	9.7		24.9	39.2		20.1	11.4	
QSRatio												
98th Percentile Output:												
fB%				2.1	2.4		2.0	1.9		2.1	2.3	
BOQ				24.1	11.8		28.6	43.9		23.5	13.7	
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				1089	254	1122		1447	371	198	1501	404
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
WB Left		A			SB Left	A			
Thru		A			Thru	A	A	A	
Right		A			Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right	A	A	A	
Green		24.3	0.0			5.8	5.3	7.9	0.0
Yellow		4.0				3.2	4.3	4.3	
All Red		1.5				0.8	1.8	1.8	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1285	3437	0.89	0.37	27.3	C		
T	696	1863	0.38	0.37	15.2	B	14.5	B
R	1583	1583	0.75	1.00	2.0	A		
Northbound								
T	2009	6765	0.76	0.30	22.5	C	24.7	C
R	470	1583	0.83	0.30	33.4	C		
Southbound								
L	307	3437	0.68	0.09	34.6	C		
T	3029	6765	0.52	0.45	13.1	B	15.5	B
R	709	1583	0.60	0.45	15.0	B		

Intersection Delay = 17.7 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Macarthur at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1089	254	1122		1447	371	198	1501	404
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				287	67	295		381	98	52	395	106
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L		T	R		T	R	L		T	R
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0
Adj Flow				1146	267	1181		1523	391	208	1580	425
%InSharedLn												
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0	0	0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	24.3	0.0				5.8	5.3	7.9	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1089	254	1122		1447	371	198	1501	404
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				1146	267	1181		1523	391	208	1580	425
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
Lane group				L		T	R		T	R	L		T	R
Adj flow				1146	267	1181		1523	391	208	1580	425
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	1146	3437		0.33	0.37	1285	0.89
Prot								
Perm								
Thru	T	267	1863		0.14	0.37	696	0.38
Right	R	1181	1583	#	0.75	1.00	1583	0.75
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1523	6765		0.23	0.30	2009	0.76
Right	R	391	1583		0.25	0.30	470	0.83
Southbound								
Prot								
Perm								
Left	L	208	3437		0.06	0.09	307	0.68
Prot								
Perm								
Thru	T	1580	6765		0.23	0.45	3029	0.52
Right	R	425	1583		0.27	0.45	709	0.60

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.75
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.75

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.89	0.37	19.1	1.000	1285	0.42	8.2	0.0	27.3	C		
T	0.38	0.37	14.9	1.000	696	0.11	0.4	0.0	15.2	B	14.5	B
R	0.75	1.00	0.0	0.950	1583	0.30	2.0	0.0	2.0	A		
Northbound												
T	0.76	0.30	20.7	1.000	2009	0.31	1.7	0.0	22.5	C	24.7	C
R	0.83	0.30	21.3	1.000	470	0.37	12.1	0.0	33.4	C		
Southbound												
L	0.68	0.09	28.7	1.000	307	0.25	5.9	0.0	34.6	C		

T	0.52	0.45	12.9	1.000	3029	0.13	0.2	0.0	13.1	B	15.5 B
R	0.60	0.45	13.6	1.000	709	0.19	1.4	0.0	15.0	B	

Intersection delay = 17.7 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	20.4	19.1	0.00	0.0	0.0	27.3
T	0.0	0.00	20.4	14.9	0.00	0.0	0.0	15.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.0
Northbound								
	0.0						0.0	
T	0.0	0.00	22.8	20.7	0.00	0.0	0.0	22.5
R	0.0	0.00	22.8	21.3	0.00	0.0	0.0	33.4
Southbound								
L	0.0	0.00	29.6	28.7	0.00	0.0	0.0	34.6
T	0.0	0.00	17.9	12.9	0.00	0.0	0.0	13.1
R	0.0	0.00	17.9	13.6	0.00	0.0	0.0	15.0

Intersection Delay 17.7 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound				Westbound				Northbound				Southbound			
LaneGroup					L	T	R		T	R			L	T	R	
Init Queue					0.0	0.0	0.0		0.0	0.0			0.0	0.0	0.0	
Flow Rate					590	267	1181		419	391			107	435	425	
So					1900	1900	1900		1900	1900			1900	1900	1900	
No.Lanes	0	0	0		2	1	1	0	4	1			2	4	1	
SL					1770	1863	1583		1862	1583			1770	1862	1583	
LnCapacity					661	696	1583		553	470			158	833	709	
Flow Ratio					0.3	0.1	0.7		0.2	0.2			0.1	0.2	0.3	
v/c Ratio					0.89	0.38	0.75		0.76	0.83			0.68	0.52	0.60	
Grn Ratio					0.37	0.37	1.00		0.30	0.30			0.09	0.45	0.45	
I Factor						1.000			1.000					1.000		
AT or PVG					3	3	3		3	3			3	3	3	
Pltn Ratio					1.00	1.00	1.00		1.00	1.00			1.00	1.00	1.00	
PF2					1.00	1.00			1.00	1.00			1.00	1.00	1.00	
Q1					10.0	3.5			6.9	6.6			1.9	5.7	5.8	
kB					0.4	0.5	0.7		0.4	0.4			0.2	0.5	0.5	
Q2					2.8	0.3	2.1		1.2	1.5			0.4	0.6	0.7	
Q Average					12.8	3.8			8.0	8.1			2.2	6.2	6.5	
Q Spacing					25.0	25.0	25.0		25.0	25.0			25.0	25.0	25.0	
Q Storage					0	0	0		0	0			0	0	0	
Q S Ratio																
70th Percentile Output:																
fB%					1.2	1.2			1.2	1.2			1.2	1.2	1.2	
BOQ					15.0	4.5			9.5	9.6			2.7	7.4	7.7	
QSRatio																
85th Percentile Output:																
fB%					1.5	1.6			1.5	1.5			1.6	1.5	1.5	
BOQ					19.2	6.0			12.3	12.4			3.5	9.6	10.0	
QSRatio																
90th Percentile Output:																
fB%					1.6	1.7			1.7	1.7			1.8	1.7	1.7	
BOQ					20.6	6.6			13.4	13.6			3.9	10.5	10.9	
QSRatio																
95th Percentile Output:																
fB%					1.8	2.0			1.9	1.9			2.0	1.9	1.9	
BOQ					23.0	7.6			15.1	15.3			4.6	12.0	12.4	
QSRatio																
98th Percentile Output:																
fB%					2.1	2.4			2.2	2.2			2.5	2.3	2.3	
BOQ					26.6	9.3			18.0	18.2			5.7	14.4	14.9	
QSRatio																

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				702	273	659		2458	695	594	1418	319
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
WB Left	A				SB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right	A	A	A	
Green	19.9	0.0				18.7	8.5	31.2	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	684	3437	1.08	0.20	98.2	F		
T	371	1863	0.77	0.20	47.7	D	50.2	D
R	1583	1583	0.44	1.00	0.2	A		
Northbound								
T	3098	6765	0.84	0.46	25.9	C	34.1	C
R	725	1583	1.01	0.46	62.9	E		
Southbound								
L	643	3437	0.97	0.19	68.9	E		
T	4634	6765	0.32	0.69	6.4	A	22.3	C
R	1084	1583	0.31	0.69	6.5	A		

Intersection Delay = 33.9 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Macarthur at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				702	273	659		2458	695	594	1418	319
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				185	72	173		647	183	156	373	84
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L		T	R		T	R	L		T	R
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0	
Adj Flow				739	287	694		2587	732	625	1493	336
%InSharedLn												
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0	0	0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	19.9	0.0				18.7	8.5	31.2	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				702	273	659		2458	695	594	1418	319
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				739	287	694		2587	732	625	1493	336
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
Lane group				L		T	R		T	R	L		T	R
Adj flow				739	287	694		2587	732	625	1493	336
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	739	3437	#	0.22	0.20	684	1.08
Prot								
Perm								
Thru	T	287	1863		0.15	0.20	371	0.77
Right	R	694	1583		0.44	1.00	1583	0.44
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2587	6765		0.38	0.46	3098	0.84
Right	R	732	1583	#	0.46	0.46	725	1.01
Southbound								
Prot								
Perm								
Left	L	625	3437	#	0.18	0.19	643	0.97
Prot								
Perm								
Thru	T	1493	6765		0.22	0.69	4634	0.32
Right	R	336	1583		0.21	0.69	1084	0.31

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.86
Total lost time per cycle, L = 15.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.02

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.08	0.20	40.0	1.000	684	0.50	58.2	0.0	98.2	F		
T	0.77	0.20	37.9	1.000	371	0.32	9.8	0.0	47.7	D	50.2	D
R	0.44	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Northbound												
T	0.84	0.46	23.8	1.000	3098	0.37	2.1	0.0	25.9	C	34.1	C
R	1.01	0.46	27.1	1.000	725	0.50	35.8	0.0	62.9	E		
Southbound												
L	0.97	0.19	40.4	1.000	643	0.48	28.5	0.0	68.9	E		

T	0.32	0.69	6.4	1.000	4634	0.11	0.0	0.0	6.4	A	22.3 C
R	0.31	0.69	6.3	1.000	1084	0.11	0.2	0.0	6.5	A	

Intersection delay = 33.9 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	100.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	100.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	100.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	40.0	40.0	0.00	13.8	0.0	98.2
T	0.0	0.00	40.0	37.9	0.00	0.0	0.0	47.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Northbound								
	0.0						0.0	
T	0.0	0.00	27.1	23.8	0.00	0.0	0.0	25.9
R	0.0	0.00	27.1	27.1	0.00	1.7	0.0	62.9
Southbound								
L	0.0	0.00	40.7	40.4	0.00	0.0	0.0	68.9
T	0.0	0.00	15.8	6.4	0.00	0.0	0.0	6.4
R	0.0	0.00	15.8	6.3	0.00	0.0	0.0	6.5

Intersection Delay 33.9 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound		
LaneGroup				L	T	R	T	R	L	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				380	287	694	712	732	321	411	336
So				1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	1	1	4	1	2	4	1
SL				1770	1863	1583	1862	1583	1770	1862	1583
LnCapacity				352	371	1583	852	725	331	1275	1084
Flow Ratio				0.2	0.2	0.4	0.4	0.5	0.2	0.2	0.2
v/c Ratio				1.08	0.77	0.44	0.84	1.01	0.97	0.32	0.31
Grn Ratio				0.20	0.20	1.00	0.46	0.46	0.19	0.69	0.69
I Factor					1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1				10.6	7.5		17.4	20.3	8.9	4.6	3.7
kB				0.4	0.4	1.0	0.7	0.6	0.4	0.9	0.8
Q2				6.4	1.2	0.8	2.9	7.9	3.3	0.4	0.3
Q Average				17.0	8.8		20.3	28.2	12.2	5.0	4.1
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0	0
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2		1.2	1.1	1.2	1.2	1.2
BOQ				19.8	10.4		23.5	32.4	14.3	6.0	4.9
QSRatio											
85th Percentile Output:											
fB%				1.5	1.5		1.5	1.4	1.5	1.6	1.6
BOQ				24.9	13.4		29.5	40.0	18.3	7.8	6.4
QSRatio											
90th Percentile Output:											
fB%				1.6	1.7		1.5	1.5	1.6	1.7	1.7
BOQ				26.7	14.6		31.3	42.3	19.7	8.6	7.0
QSRatio											
95th Percentile Output:											
fB%				1.7	1.9		1.7	1.6	1.8	2.0	2.0
BOQ				29.4	16.4		34.4	45.9	22.0	9.8	8.1
QSRatio											
98th Percentile Output:											
fB%				2.0	2.2		1.9	1.8	2.1	2.4	2.4
BOQ				33.4	19.4		38.7	51.2	25.5	11.9	9.9
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: SR-55 NB Ramps

Inter.: Baker at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
LGConfig	L	T			T	R		LTR				
Volume	527	969			212	124	309	364	288			
Lane Width	12.0	12.0			12.0	12.0		12.0				
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	34.8	5.1	5.0	0.0		36.4	0.0		
Yellow	3.2	4.0	4.0			3.5			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	616	1770	0.90	0.35	47.4	D		
T	1919	3547	0.53	0.54	15.1	B	26.5	C
Westbound								
T	536	3547	0.42	0.15	39.0	D	40.1	D
R	239	1583	0.55	0.15	42.0	D		
Northbound								
LTR	1214	3334	0.83	0.36	34.1	C	34.1	C
Southbound								

Intersection Delay = 30.7 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: AM
Intersection: Baker at SR-55 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2008
Project ID: IBC Vision Traffic Study - Existing With Project

E/W St: SR-55 NB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	527	969			212	124	309	364	288			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	139	255			56	33	81	96	76			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900		1900				
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
LGConfig	L	T			T	R		LTR				
Lane Width	12.0	12.0			12.0	12.0		12.0				
RTOR Vol					0				0			
Adj Flow	555	1020			223	131		1011				
%InSharedLn												
Prop LTs		0.000			0.000			0.321				
Prop RTs		0.000			0.000	1.000		0.300				
Peds Bikes					0			0			0	
Buses	0	0			0	0		0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0		0.0				
Arriv. Type	3	3			3	3		3				
Unit Ext.	3.0	3.0			3.0	3.0		3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0		2.0				
Ext of g	2.0	2.0			2.0	2.0		2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	34.8	5.1	5.0	0.0		36.4	0.0	
Yellow	3.2	4.0	4.0			3.5		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	527	969			212	124	309	364	288			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	555	1020			223	131	325	383	303			
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
Lane group	L	T			T	R		LTR				
Adj flow	555	1020			223	131		1011				
Prop LTs		0.000			0.000			0.321				
Prop RTs		0.000			0.000	1.000		0.300				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound			Northbound			Southbound			
LG	L	T			T	R		LTR						
So	1900	1900			1900	1900		1900						
Lanes	1	2	0	0	2	1	0	2	0	0	0	0		
fW	1.000	1.000			1.000	1.000		1.000						
fHV	0.980	0.980			0.980	0.980		0.980						
fG	1.000	1.000			1.000	1.000		1.000						
fP	1.000	1.000			1.000	1.000		1.000						
fBB	1.000	1.000			1.000	1.000		1.000						
fA	1.000	1.000			1.000	1.000		1.000						
fLU	1.000	0.952			0.952	1.000		0.952						
fRT		1.000			1.000	0.850		0.955						
fLT	0.950	1.000			1.000			0.984						
Sec.														
fLpb	1.000	1.000			1.000			1.000						
fRpb		1.000			1.000	1.000		1.000						
S	1770	3547			3547	1583		3334						
Sec.														

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	555	1770	#	0.31	0.35	616	0.90
Prot								
Perm								
Thru	T	1020	3547		0.29	0.54	1919	0.53
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	223	3547		0.06	0.15	536	0.42
Right	R	131	1583	#	0.08	0.15	239	0.55
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	1011	3334	#	0.30	0.36	1214	0.83
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.70
Total lost time per cycle, L = 13.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.81

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.90	0.35	31.0	1.000	616	0.42	16.4	0.0	47.4	D		
T	0.53	0.54	14.8	1.000	1919	0.13	0.3	0.0	15.1	B	26.5	C
Westbound												
T	0.42	0.15	38.5	1.000	536	0.11	0.5	0.0	39.0	D	40.1	D
R	0.55	0.15	39.3	1.000	239	0.15	2.7	0.0	42.0	D		
Northbound												
LTR	0.83	0.36	29.0	1.000	1214	0.37	5.1	0.0	34.1	C	34.1	C
Southbound												

Intersection delay = 30.7 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.321	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	100.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	32.6	31.0	0.00	0.0	0.0	47.4

T	0.0	0.00	22.9	14.8	0.00	0.0	0.0	15.1
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	42.5	38.5	0.00	0.0	0.0	39.0
R	0.0	0.00	42.5	39.3	0.00	0.0	0.0	42.0
Northbound								
	0.0						0.0	
LTR	0.0	0.00	31.8	29.0	0.00	0.0	0.0	34.1
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 30.7 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound			Southbound		
LaneGroup	L	T		T	R	LTR					
Init Queue	0.0	0.0		0.0	0.0	0.0					
Flow Rate	555	535		117	131	530					
So	1900	1900		1900	1900	1900					
No.Lanes	1	2	0	0	2	1	0	2	0	0	0	0
SL	1770	1862		1862	1583	1751					
LnCapacity	616	1007		281	239	637					
Flow Ratio	0.3	0.3		0.1	0.1	0.3					
v/c Ratio	0.90	0.53		0.42	0.55	0.83					
Grn Ratio	0.35	0.54		0.15	0.15	0.36					
I Factor		1.000		1.000		1.000					
AT or PVG	3	3		3	3	3					
Pltn Ratio	1.00	1.00		1.00	1.00	1.00					
PF2	1.00	1.00		1.00	1.00	1.00					
Q1	14.6	9.6		2.9	3.4	13.4					
kB	0.5	0.7		0.3	0.3	0.6					
Q2	3.4	0.8		0.2	0.4	2.4					
Q Average	18.1	10.4		3.2	3.7	15.8					
Q Spacing	25.0	25.0		25.0	25.0	25.0					
Q Storage	0	0		0	0	0					
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2		1.2	1.2	1.2					
BOQ	21.0	12.2		3.8	4.4	18.4					
QSRatio											
85th Percentile Output:											
fB%	1.5	1.5		1.6	1.6	1.5					
BOQ	26.5	15.7		5.0	5.8	23.3					
QSRatio											
90th Percentile Output:											
fB%	1.6	1.6		1.7	1.7	1.6					
BOQ	28.2	17.0		5.5	6.5	25.0					
QSRatio											
95th Percentile Output:											
fB%	1.7	1.8		2.0	2.0	1.7					
BOQ	31.1	19.1		6.4	7.4	27.6					
QSRatio											
98th Percentile Output:											
fB%	1.9	2.1		2.5	2.5	2.0					
BOQ	35.2	22.3		7.9	9.2	31.5					
QSRatio											

ERROR MESSAGES

No errors to report

HCS+: Signalized Intersections Release 5.4

Analyst: Robert Chan
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: SR-55 NB Ramps

Inter.: Baker at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
LGConfig	L	T			T	R		LTR				
Volume	271	377			822	331	385	440	272			
Lane Width	12.0	12.0			12.0	12.0		12.0				
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	15.0	14.0	5.0	0.0		32.3	0.0		
Yellow	3.2	4.0	4.0			3.5			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 85.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	312	1770	0.91	0.18	64.2	E		
T	1803	3547	0.22	0.51	11.6	B	33.6	C
Westbound								
T	1002	3547	0.86	0.28	36.8	D	36.8	D
R	447	1583	0.78	0.28	36.6	D		
Northbound								
LTR	1275	3356	0.91	0.38	34.3	C	34.3	C
Southbound								

Intersection Delay = 35.1 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	Robert Chan
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Baker at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: SR-55 NB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	271	377			822	331	385	440	272			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	71	99			216	87	101	116	72			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900		1900				
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
LGConfig	L	T			T	R		LTR				
Lane Width	12.0	12.0			12.0	12.0		12.0				
RTOR Vol					0			0				
Adj Flow	285	397			865	348		1154				
%InSharedLn												
Prop LTs		0.000			0.000			0.351				
Prop RTs		0.000		0.000		1.000	0.248					
Peds Bikes				0			0			0		
Buses	0	0			0	0		0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0		0.0				
Arriv. Type	3	3			3	3		3				
Unit Ext.	3.0	3.0			3.0	3.0		3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0		2.0				
Ext of g	2.0	2.0			2.0	2.0		2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	15.0	14.0	5.0	0.0		32.3	0.0	
Yellow	3.2	4.0	4.0			3.5		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 85.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	271	377			822	331	385	440	272			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	285	397			865	348	405	463	286			
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
Lane group	L	T			T	R		LTR				
Adj flow	285	397			865	348		1154				
Prop LTs		0.000			0.000			0.351				
Prop RTs		0.000		0.000		1.000	0.248					

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound			Northbound			Southbound		
LG	L	T			T	R		LTR					
So	1900	1900			1900	1900		1900					
Lanes	1	2	0	0	2	1	0	2	0	0	0	0	
fW	1.000	1.000			1.000	1.000		1.000					
fHV	0.980	0.980			0.980	0.980		0.980					
fG	1.000	1.000			1.000	1.000		1.000					
fP	1.000	1.000			1.000	1.000		1.000					
fBB	1.000	1.000			1.000	1.000		1.000					
fA	1.000	1.000			1.000	1.000		1.000					
fLU	1.000	0.952			0.952	1.000		0.952					
fRT		1.000			1.000	0.850		0.963					
fLT	0.950	1.000			1.000			0.983					
Sec.													
fLpb	1.000	1.000			1.000			1.000					
fRpb		1.000			1.000	1.000		1.000					
S	1770	3547			3547	1583		3356					
Sec.													

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	285	1770	#	0.16	0.18	312	0.91
Prot								
Perm								
Thru	T	397	3547		0.11	0.51	1803	0.22
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	865	3547	#	0.24	0.28	1002	0.86
Right	R	348	1583		0.22	0.28	447	0.78
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	1154	3356	#	0.34	0.38	1275	0.91
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.75
Total lost time per cycle, L = 13.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.89

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.91	0.18	34.4	1.000	312	0.43	29.8	0.0	64.2	E		
T	0.22	0.51	11.6	1.000	1803	0.11	0.1	0.0	11.6	B	33.6	C
Westbound												
T	0.86	0.28	28.9	1.000	1002	0.39	7.9	0.0	36.8	D	36.8	D
R	0.78	0.28	28.1	1.000	447	0.33	8.5	0.0	36.6	D		
Northbound												
LTR	0.91	0.38	24.9	1.000	1275	0.43	9.4	0.0	34.3	C	34.3	C
Southbound												

Intersection delay = 35.1 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 85.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 85.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.351	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	85.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	35.0	34.4	0.00	0.0	0.0	64.2

T	0.0	0.00	20.9	11.6	0.00	0.0	0.0	11.6
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	30.5	28.9	0.00	0.0	0.0	36.8
R	0.0	0.00	30.5	28.1	0.00	0.0	0.0	36.6
Northbound								
	0.0						0.0	
LTR	0.0	0.00	26.4	24.9	0.00	0.0	0.0	34.3
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 35.1 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound			Southbound		
LaneGroup	L	T		T	R	LTR					
Init Queue	0.0	0.0		0.0	0.0	0.0					
Flow Rate	285	208		454	348	606					
So	1900	1900		1900	1900	1900					
No.Lanes	1	2	0	0 2	1	0	2	0	0	0	0
SL	1770	1862		1862	1583	1762					
LnCapacity	312	946		526	447	669					
Flow Ratio	0.2	0.1		0.2	0.2	0.3					
v/c Ratio	0.91	0.22		0.86	0.78	0.91					
Grn Ratio	0.18	0.51		0.28	0.28	0.38					
I Factor		1.000		1.000		1.000					
AT or PVG	3	3		3	3	3					
Pltn Ratio	1.00	1.00		1.00	1.00	1.00					
PF2	1.00	1.00		1.00	1.00	1.00					
Q1	6.6	2.7		10.2	7.6	13.5					
kB	0.3	0.6		0.5	0.4	0.5					
Q2	2.1	0.2		2.3	1.3	3.5					
Q Average	8.7	2.9		12.5	8.9	17.0					
Q Spacing	25.0	25.0		25.0	25.0	25.0					
Q Storage	0	0		0	0	0					
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2		1.2	1.2	1.2					
BOQ	10.3	3.5		14.6	10.5	19.8					
QSRatio											
85th Percentile Output:											
fB%	1.5	1.6		1.5	1.5	1.5					
BOQ	13.3	4.6		18.7	13.5	25.0					
QSRatio											
90th Percentile Output:											
fB%	1.7	1.7		1.6	1.7	1.6					
BOQ	14.5	5.1		20.1	14.7	26.7					
QSRatio											
95th Percentile Output:											
fB%	1.9	2.0		1.8	1.9	1.7					
BOQ	16.4	5.8		22.4	16.5	29.5					
QSRatio											
98th Percentile Output:											
fB%	2.2	2.5		2.1	2.2	2.0					
BOQ	19.3	7.3		25.9	19.6	33.5					
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: SR-55 SB Ramps

Inter.: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
LGConfig		T	R	L	T						LTR	
Volume		1113	243	49	401					413	132	252
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0								0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
WB Left	A				SB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	6.0	8.8	12.2	0.0		19.4	0.0		
Yellow	3.0	4.0	4.0			3.3			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 64.7 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1425	3547	0.82	0.40	21.3	C	20.0+	C
R	636	1583	0.40	0.40	14.2	B		
Westbound								
L	164	1770	0.32	0.09	28.6	C		
T	1974	3547	0.21	0.56	7.3	A	9.6	A
Northbound								
Southbound								
LTR	987	3293	0.85	0.30	28.4	C	28.4	C

Intersection Delay = 20.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM Peak Hour
Intersection:	Baker at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: SR-55 SB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1113	243	49	401					413	132	252
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		293	64	13	106					109	35	66
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900	1900	1900						1900	
ParkExist												
NumPark												
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
LGConfig		T	R	L	T						LTR	
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0
Adj Flow		1172	256	52	422						839	
%InSharedLn												
Prop LTs		0.000			0.000						0.518	
Prop RTs		0.000	1.000		0.000						0.316	
Peds Bikes		0						0			0	
Buses		0	0	0	0						0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0	0.0	0.0						0.0	
Arriv. Type		3	3	3	3						3	
Unit Ext.		3.0	3.0	3.0	3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0	2.0	2.0						2.0	
Ext of g		2.0	2.0	2.0	2.0						2.0	
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	6.0	8.8	12.2	0.0	19.4	0.0		
Yellow	3.0	4.0	4.0		3.3			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 64.7 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1113	243	49	401					413	132	252
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		1172	256	52	422					435	139	265
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
Lane group		T	R	L	T						LTR	
Adj flow		1172	256	52	422						839	
Prop LTs		0.000			0.000						0.518	
Prop RTs		0.000	1.000		0.000						0.316	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound				Southbound	
LG	T	R	L	T					LTR	
So	1900	1900	1900	1900					1900	
Lanes 0	2	1	1	2	0	0	0	0	2	0
fW	1.000	1.000	1.000	1.000					1.000	
fHV	0.980	0.980	0.980	0.980					0.980	
fG	1.000	1.000	1.000	1.000					1.000	
fP	1.000	1.000	1.000	1.000					1.000	
fBB	1.000	1.000	1.000	1.000					1.000	
fA	1.000	1.000	1.000	1.000					1.000	
fLU	0.952	1.000	1.000	0.952					0.952	
fRT	1.000	0.850		1.000					0.953	
fLT	1.000		0.950	1.000					0.975	
Sec.										
fLpb	1.000		1.000	1.000					1.000	
fRpb	1.000	1.000		1.000					1.000	
S	3547	1583	1770	3547					3293	
Sec.										

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1172	3547	#	0.33	0.40	1425	0.82
Right	R	256	1583		0.16	0.40	636	0.40
Westbound								
Prot								
Perm								
Left	L	52	1770	#	0.03	0.09	164	0.32
Prot								
Perm								
Thru	T	422	3547		0.12	0.56	1974	0.21
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	839	3293	#	0.25	0.30	987	0.85
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.61
Total lost time per cycle, L = 13.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.77

Control Delay and LOS Determination_____

Appr/ Lane	Ratios		Unf Del	Prog Adj	Lane Grp	Incremental Factor	Del	Res Del	Lane Group		Approach	
Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
T	0.82	0.40	17.3	1.000	1425	0.36	4.0	0.0	21.3	C	20.0+	C
R	0.40	0.40	13.8	1.000	636	0.11	0.4	0.0	14.2	B		
Westbound												
L	0.32	0.09	27.4	1.000	164	0.11	1.1	0.0	28.6	C		
T	0.21	0.56	7.2	1.000	1974	0.11	0.1	0.0	7.3	A	9.6	A
Northbound												
Southbound												

LTR 0.85 0.30 21.3 1.000 987 0.38 7.2 0.0 28.4 C 28.4 C

Intersection delay = 20.8 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 64.7 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 64.7 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.518
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	64.7 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	19.3	17.3	0.00	0.0	0.0	21.3
R	0.0	0.00	19.3	13.8	0.00	0.0	0.0	14.2
Westbound								
L	0.0	0.00	29.3	27.4	0.00	0.0	0.0	28.6
T	0.0	0.00	14.3	7.2	0.00	0.0	0.0	7.3
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LTR	0.0	0.00	22.6	21.3	0.00	0.0	0.0	28.4
	0.0						0.0	

Intersection Delay 20.8 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound			Southbound		
LaneGroup	T	R	L	T					LTR		
Init Queue	0.0	0.0	0.0	0.0					0.0		
Flow Rate	615	256	52	221					440		
So	1900	1900	1900	1900					1900		
No.Lanes	0 2	1	1	2	0	0	0	0	2	0	
SL	1862	1583	1770	1862					1729		
LnCapacity	748	636	164	1036					518		
Flow Ratio	0.3	0.2	0.0	0.1					0.3		
v/c Ratio	0.82	0.40	0.32	0.21					0.85		
Grn Ratio	0.40	0.40	0.09	0.56					0.30		
I Factor	1.000			1.000					1.000		
AT or PVG	3	3	3	3					3		
Pltn Ratio	1.00	1.00	1.00	1.00					1.00		
PF2	1.00	1.00	1.00	1.00					1.00		
Q1	9.9	3.3	0.9	2.0					7.4		
kB	0.5	0.4	0.2	0.6					0.4		
Q2	2.0	0.3	0.1	0.2					1.8		
Q Average	11.8	3.6	1.0	2.2					9.2		
Q Spacing	25.0	25.0	25.0	25.0					25.0		
Q Storage	0	0	0	0					0		
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2	1.2	1.2					1.2		
BOQ	13.9	4.3	1.2	2.6					10.9		
QSRatio											
85th Percentile Output:											
fB%	1.5	1.6	1.6	1.6					1.5		
BOQ	17.8	5.6	1.5	3.4					14.1		
QSRatio											
90th Percentile Output:											
fB%	1.6	1.7	1.8	1.8					1.7		
BOQ	19.2	6.2	1.7	3.8					15.3		
QSRatio											
95th Percentile Output:											
fB%	1.8	2.0	2.1	2.0					1.9		
BOQ	21.4	7.1	2.0	4.4					17.2		
QSRatio											
98th Percentile Output:											
fB%	2.1	2.5	2.6	2.5					2.2		
BOQ	24.9	8.8	2.5	5.5					20.3		
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: SR-55 SB Ramps

Inter.: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
LGConfig		T	R	L	T						LTR	
Volume		545	394	210	953					178	338	434
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	10.7	11.5	5.0	0.0	24.5	0.0		
Yellow	3.0	4.0	4.0		3.3			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 70.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1089	3547	0.53	0.31	20.5	C	27.3	C
R	486	1583	0.85	0.31	36.6	D		
Westbound								
L	271	1770	0.82	0.15	46.0	D		
T	1834	3547	0.55	0.52	11.7	B	17.9	B
Northbound								
Southbound								
LTR	1146	3273	0.87	0.35	28.9	C	28.9	C

Intersection Delay = 24.2 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Baker at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: SR-55 SB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		545	394	210	953					178	338	434
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		143	104	55	251					47	89	114
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900	1900	1900						1900	
ParkExist												
NumPark												
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
LGConfig		T	R	L	T						LTR	
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0
Adj Flow		574	415	221	1003						1000	
%InSharedLn												
Prop LTs		0.000			0.000						0.187	
Prop RTs		0.000	1.000		0.000						0.457	
Peds Bikes		0						0			0	
Buses		0	0	0	0						0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0	0.0	0.0						0.0	
Arriv. Type		3	3	3	3						3	
Unit Ext.		3.0	3.0	3.0	3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0	2.0	2.0						2.0	
Ext of g		2.0	2.0	2.0	2.0						2.0	
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	10.7	11.5	5.0	0.0		24.5	0.0	
Yellow	3.0	4.0	4.0			3.3		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 70.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		545	394	210	953					178	338	434
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		574	415	221	1003					187	356	457
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
Lane group		T	R	L	T						LTR	
Adj flow		574	415	221	1003						1000	
Prop LTs		0.000			0.000						0.187	
Prop RTs		0.000	1.000		0.000						0.457	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R	L	T						LTR		
So	1900	1900	1900	1900						1900		
Lanes	0 2	0 1	0 1	0 2	0	0	0	0	0	0 2	0	0
fW	1.000	1.000	1.000	1.000						1.000		
fHV	0.980	0.980	0.980	0.980						0.980		
fG	1.000	1.000	1.000	1.000						1.000		
fP	1.000	1.000	1.000	1.000						1.000		
fBB	1.000	1.000	1.000	1.000						1.000		
fA	1.000	1.000	1.000	1.000						1.000		
fLU	0.952	1.000	1.000	0.952						0.952		
fRT	1.000	0.850		1.000						0.931		
fLT	1.000		0.950	1.000						0.991		
Sec.												
fLpb	1.000		1.000	1.000						1.000		
fRpb	1.000	1.000		1.000						1.000		
S	3547	1583	1770	3547						3273		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	574	3547		0.16	0.31	1089	0.53
Right	R	415	1583	#	0.26	0.31	486	0.85
Westbound								
Prot								
Perm								
Left	L	221	1770	#	0.12	0.15	271	0.82
Prot								
Perm								
Thru	T	1003	3547		0.28	0.52	1834	0.55
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	1000	3273	#	0.31	0.35	1146	0.87
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.69
Total lost time per cycle, L = 13.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.85

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.53	0.31	20.0	1.000	1089	0.13	0.5	0.0	20.5	C	27.3	C
R	0.85	0.31	22.8	1.000	486	0.39	13.8	0.0	36.6	D		
Westbound												
L	0.82	0.15	28.7	1.000	271	0.36	17.3	0.0	46.0	D		
T	0.55	0.52	11.4	1.000	1834	0.15	0.3	0.0	11.7	B	17.9	B
Northbound												
Southbound												

LTR	0.87	0.35	21.3	1.000	1146	0.40	7.6	0.0	28.9	C	28.9	C

Intersection delay = 24.2 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	70.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	70.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000	0.000		0.187
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	70.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	24.3	20.0	0.00	0.0	0.0	20.5
R	0.0	0.00	24.3	22.8	0.00	0.0	0.0	36.6
Westbound								
L	0.0	0.00	29.6	28.7	0.00	0.0	0.0	46.0
T	0.0	0.00	16.9	11.4	0.00	0.0	0.0	11.7
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LTR	0.0	0.00	22.8	21.3	0.00	0.0	0.0	28.9
	0.0						0.0	

Intersection Delay 24.2 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound			Southbound		
LaneGroup	T	R	L	T					LTR		
Init Queue	0.0	0.0	0.0	0.0					0.0		
Flow Rate	301	415	221	526					525		
So	1900	1900	1900	1900					1900		
No.Lanes	0 2	1	1	2	0	0	0	0	2	0	
SL	1862	1583	1770	1862					1719		
LnCapacity	571	486	271	963					601		
Flow Ratio	0.2	0.3	0.1	0.3					0.3		
v/c Ratio	0.53	0.85	0.82	0.55					0.87		
Grn Ratio	0.31	0.31	0.15	0.52					0.35		
I Factor	1.000			1.000					1.000		
AT or PVG	3	3	3	3					3		
Pltn Ratio	1.00	1.00	1.00	1.00					1.00		
PF2	1.00	1.00	1.00	1.00					1.00		
Q1	4.8	7.6	4.2	6.9					9.6		
kB	0.4	0.4	0.3	0.6					0.4		
Q2	0.5	1.9	1.0	0.7					2.4		
Q Average	5.3	9.4	5.2	7.6					12.0		
Q Spacing	25.0	25.0	25.0	25.0					25.0		
Q Storage	0	0	0	0					0		
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2	1.2	1.2					1.2		
BOQ	6.3	11.1	6.2	9.0					14.1		
QSRatio											
85th Percentile Output:											
fB%	1.6	1.5	1.6	1.5					1.5		
BOQ	8.2	14.3	8.1	11.6					18.0		
QSRatio											
90th Percentile Output:											
fB%	1.7	1.6	1.7	1.7					1.6		
BOQ	9.1	15.6	8.9	12.7					19.4		
QSRatio											
95th Percentile Output:											
fB%	1.9	1.9	1.9	1.9					1.8		
BOQ	10.3	17.5	10.1	14.3					21.6		
QSRatio											
98th Percentile Output:											
fB%	2.4	2.2	2.4	2.3					2.1		
BOQ	12.5	20.6	12.3	17.1					25.1		
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: SR-55 NB Ramps

Inter.: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	0	2	0	0	0	0
LGConfig	L	T			TR			LTR				
Volume	307	881			150	201	78	646	145			
Lane Width	12.0	12.0			12.0			12.0				
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	21.1	6.0	5.0	0.0		28.7	0.0		
Yellow	3.6	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	467	1770	0.69	0.26	30.9	C		
T	1849	3547	0.50	0.52	12.6	B	17.3	B
Westbound								
TR	648	3242	0.57	0.20	30.1	C	30.1	C
Northbound								
LTR	1235	3442	0.74	0.36	24.8	C	24.8	C
Southbound								

Intersection Delay = 21.9 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Paularino at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: SR-55 NB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	307	881			150	201	78	646	145			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	81	232			39	53	21	170	38			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900			1900				
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	0	0	2	0	0	0	0
LGConfig	L	T			TR			LTR				
Lane Width	12.0	12.0			12.0			12.0				
RTOR Vol						0			0			
Adj Flow	323	927			370			915				
%InSharedLn												
Prop LTs		0.000			0.000			0.090				
Prop RTs		0.000			0.573			0.167				
Peds Bikes					0			0			0	
Buses	0	0			0			0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0			0.0				
Arriv. Type	3	3			3			3				
Unit Ext.	3.0	3.0			3.0			3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0			2.0				
Ext of g	2.0	2.0			2.0			2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.1	6.0	5.0	0.0		28.7	0.0	
Yellow	3.6	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	307	881			150	201	78	646	145			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	323	927			158	212	82	680	153			
No. Lanes	1	2	0	0	2	0	0	2	0	0	0	0
Lane group	L	T			TR			LTR				
Adj flow	323	927			370			915				
Prop LTs		0.000			0.000			0.090				
Prop RTs		0.000			0.573			0.167				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound				Northbound				Southbound			
LG	L	T			TR				LTR							
So	1900	1900			1900				1900							
Lanes	1	2	0	0	2	0	0		2	0	0	0	0			
fW	1.000	1.000			1.000				1.000							
fHV	0.980	0.980			0.980				0.980							
fG	1.000	1.000			1.000				1.000							
fP	1.000	1.000			1.000				1.000							
fBB	1.000	1.000			1.000				1.000							
fA	1.000	1.000			1.000				1.000							
fLU	1.000	0.952			0.952				0.952							
fRT		1.000			0.914				0.975							
fLT	0.950	1.000			1.000				0.996							
Sec.																
fLpb	1.000	1.000			1.000				1.000							
fRpb		1.000			1.000				1.000							
S	1770	3547			3242				3442							
Sec.																

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	323	1770	#	0.18	0.26	467	0.69
Prot								
Perm								
Thru	T	927	3547		0.26	0.52	1849	0.50
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	370	3242	#	0.11	0.20	648	0.57
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	915	3442	#	0.27	0.36	1235	0.74
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.56
Total lost time per cycle, L = 14.20 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.68

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.69	0.26	26.5	1.000	467	0.26	4.4	0.0	30.9	C		
T	0.50	0.52	12.4	1.000	1849	0.11	0.2	0.0	12.6	B	17.3	B
Westbound												
TR	0.57	0.20	28.9	1.000	648	0.17	1.2	0.0	30.1	C	30.1	C
Northbound												
LTR	0.74	0.36	22.4	1.000	1235	0.30	2.4	0.0	24.8	C	24.8	C
Southbound												

Intersection delay = 21.9 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	80.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	80.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000	0.000	0.090	
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	29.4	26.5	0.00	0.0	0.0	30.9

T	0.0	0.00	19.1	12.4	0.00	0.0	0.0	12.6
	0.0						0.0	
Westbound								
	0.0						0.0	
TR	0.0	0.00	32.0	28.9	0.00	0.0	0.0	30.1
	0.0						0.0	
Northbound								
	0.0						0.0	
LTR	0.0	0.00	25.6	22.4	0.00	0.0	0.0	24.8
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 21.9 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	T		TR			LTR					
Init Queue	0.0	0.0		0.0			0.0					
Flow Rate	323	486		194			480					
So	1900	1900		1900			1900					
No.Lanes	1	2	0	0	2	0	0	2	0	0	0	0
SL	1770	1862		1702			1807					
LnCapacity	467	971		340			648					
Flow Ratio	0.2	0.3		0.1			0.3					
v/c Ratio	0.69	0.50		0.57			0.74					
Grn Ratio	0.26	0.52		0.20			0.36					
I Factor		1.000		1.000			1.000					
AT or PVG	3	3		3			3					
Pltn Ratio	1.00	1.00		1.00			1.00					
PF2	1.00	1.00		1.00			1.00					
Q1	6.5	7.0		3.9			9.3					
kB	0.4	0.6		0.3			0.5					
Q2	0.9	0.6		0.4			1.3					
Q Average	7.3	7.6		4.3			10.6					
Q Spacing	25.0	25.0		25.0			25.0					
Q Storage	0	0		0			0					
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2		1.2			1.2					
BOQ	8.7	9.0		5.2			12.5					
QSRatio												
85th Percentile Output:												
fB%	1.5	1.5		1.6			1.5					
BOQ	11.3	11.7		6.8			16.1					
QSRatio												
90th Percentile Output:												
fB%	1.7	1.7		1.7			1.6					
BOQ	12.3	12.8		7.5			17.4					
QSRatio												
95th Percentile Output:												
fB%	1.9	1.9		2.0			1.8					
BOQ	13.9	14.4		8.5			19.5					
QSRatio												
98th Percentile Output:												
fB%	2.3	2.3		2.4			2.1					
BOQ	16.6	17.2		10.5			22.8					
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: SR-55 NB Ramps

Inter.: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	0	2	0	0	0	0
LGConfig	L	T			TR			LTR				
Volume	256	320			685	379	129	679	76			
Lane Width	12.0	12.0			12.0			12.0				
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	14.8	6.6	22.2	0.0		27.2	0.0		
Yellow	3.6	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	291	1770	0.92	0.16	70.6	E		
T	2097	3547	0.16	0.59	8.3	A	36.0	D
Westbound								
TR	1261	3357	0.89	0.38	34.4	C	34.4	C
Northbound								
LTR	1051	3476	0.89	0.30	39.2	D	39.2	D
Southbound								

Intersection Delay = 36.4 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Paularino at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: SR-55 NB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	256	320			685	379	129	679	76			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	67	84			180	100	34	179	20			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900			1900				
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	0	0	2	0	0	0	0
LGConfig	L	T			TR			LTR				
Lane Width	12.0	12.0			12.0			12.0				
RTOR Vol						0			0			
Adj Flow	269	337			1120			931				
%InSharedLn												
Prop LTs		0.000			0.000			0.146				
Prop RTs		0.000			0.356			0.086				
Peds Bikes					0			0			0	
Buses	0	0			0			0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0			0.0				
Arriv. Type	3	3			3			3				
Unit Ext.	3.0	3.0			3.0			3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0			2.0				
Ext of g	2.0	2.0			2.0			2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	14.8	6.6	22.2	0.0		27.2	0.0	
Yellow	3.6	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	256	320			685	379	129	679	76			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	269	337			721	399	136	715	80			
No. Lanes	1	2	0	0	2	0	0	2	0	0	0	0
Lane group	L	T			TR			LTR				
Adj flow	269	337			1120			931				
Prop LTs		0.000			0.000			0.146				
Prop RTs		0.000			0.356			0.086				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound				Northbound				Southbound			
LG	L	T			TR				LTR							
So	1900	1900			1900				1900							
Lanes	1	2	0	0	2	0	0		2	0	0	0	0			
fW	1.000	1.000			1.000				1.000							
fHV	0.980	0.980			0.980				0.980							
fG	1.000	1.000			1.000				1.000							
fP	1.000	1.000			1.000				1.000							
fBB	1.000	1.000			1.000				1.000							
fA	1.000	1.000			1.000				1.000							
fLU	1.000	0.952			0.952				0.952							
fRT		1.000			0.947				0.987							
fLT	0.950	1.000			1.000				0.993							
Sec.																
fLpb	1.000	1.000			1.000				1.000							
fRpb		1.000			1.000				1.000							
S	1770	3547			3357				3476							
Sec.																

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	269	1770	#	0.15	0.16	291	0.92
Prot								
Perm								
Thru	T	337	3547		0.10	0.59	2097	0.16
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1120	3357	#	0.33	0.38	1261	0.89
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	931	3476	#	0.27	0.30	1051	0.89
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.75
Total lost time per cycle, L = 14.20 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.89

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.92	0.16	37.0	1.000	291	0.44	33.6	0.0	70.6	E		
T	0.16	0.59	8.3	1.000	2097	0.11	0.0	0.0	8.3	A	36.0	D
Westbound												
TR	0.89	0.38	26.3	1.000	1261	0.41	8.1	0.0	34.4	C	34.4	C
Northbound												
LTR	0.89	0.30	29.9	1.000	1051	0.41	9.3	0.0	39.2	D	39.2	D
Southbound												

Intersection delay = 36.4 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	90.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	90.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000	0.000	0.146	
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	90.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	37.6	37.0	0.00	0.0	0.0	70.6

T	0.0	0.00	18.4	8.3	0.00	0.0	0.0	8.3
	0.0						0.0	
Westbound								
	0.0						0.0	
TR	0.0	0.00	28.1	26.3	0.00	0.0	0.0	34.4
	0.0						0.0	
Northbound								
	0.0						0.0	
LTR	0.0	0.00	31.4	29.9	0.00	0.0	0.0	39.2
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 36.4 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	T		TR			LTR					
Init Queue	0.0	0.0		0.0			0.0					
Flow Rate	269	176		588			488					
So	1900	1900		1900			1900					
No.Lanes	1	2	0	0	2	0	0	2	0	0	0	0
SL	1770	1862		1763			1825					
LnCapacity	291	1101		662			551					
Flow Ratio	0.2	0.1		0.3			0.3					
v/c Ratio	0.92	0.16		0.89			0.89					
Grn Ratio	0.16	0.59		0.38			0.30					
I Factor		1.000		1.000			1.000					
AT or PVG	3	3		3			3					
Pltn Ratio	1.00	1.00		1.00			1.00					
PF2	1.00	1.00		1.00			1.00					
Q1	6.6	2.0		13.8			11.6					
kB	0.3	0.7		0.5			0.5					
Q2	2.2	0.1		3.2			2.8					
Q Average	8.9	2.1		17.0			14.4					
Q Spacing	25.0	25.0		25.0			25.0					
Q Storage	0	0		0			0					
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2		1.2			1.2					
BOQ	10.4	2.5		19.8			16.8					
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6		1.5			1.5					
BOQ	13.5	3.4		24.9			21.4					
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8		1.6			1.6					
BOQ	14.7	3.7		26.6			23.0					
QSRatio												
95th Percentile Output:												
fB%	1.9	2.0		1.7			1.8					
BOQ	16.5	4.3		29.4			25.5					
QSRatio												
98th Percentile Output:												
fB%	2.2	2.5		2.0			2.0					
BOQ	19.5	5.4		33.4			29.2					
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: Robert Chan
Agency:
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: SR-55 SB Ramps

Inter.: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
LGConfig		TR		L	T						LTR	
Volume		731	134	59	165					459	658	211
Lane Width		12.0		12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	4.8	5.0	19.9	0.0	46.6	0.0		
Yellow	3.2	4.0	4.0		3.6			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 95.1 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	1089	3464	0.84	0.31	36.1	D	36.1	D
Westbound								
L	89	1770	0.70	0.05	65.6	E		
T	1451	3547	0.12	0.41	17.5	B	30.1	C
Northbound								
Southbound								
LTR	1668	3403	0.84	0.49	24.9	C	24.9	C

Intersection Delay = 29.4 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: Robert Chan
Agency/Co.:
Date Performed: 11/17/09
Analysis Time Period: AM
Intersection: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2008
Project ID: IBC Vision Traffic Study - Existing With Project

E/W St: SR-55 SB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		731	134	59	165					459	658	211
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		192	35	16	43					121	173	56
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900		1900	1900						1900	
ParkExist												
NumPark												
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
LGConfig		TR		L	T						LTR	
Lane Width		12.0		12.0	12.0						12.0	
RTOR Vol			0									0
Adj Flow		910		62	174						1398	
%InSharedLn												
Prop LTs		0.000			0.000						0.345	
Prop RTs		0.155			0.000						0.159	
Peds Bikes		0						0			0	
Buses		0		0	0						0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0						0.0	
Arriv. Type		3		3	3						3	
Unit Ext.		3.0		3.0	3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0		2.0	2.0						2.0	
Ext of g		2.0		2.0	2.0						2.0	
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left		A			SB Left	A		
Thru		A	A	A	Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		4.8	5.0	19.9	0.0	46.6	0.0	
Yellow		3.2	4.0	4.0		3.6		
All Red		1.0	1.0	1.0		1.0		

Cycle Length: 95.1 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		731	134	59	165					459	658	211
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		769	141	62	174					483	693	222
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
Lane group		TR		L	T						LTR	
Adj flow		910		62	174						1398	
Prop LTs		0.000			0.000						0.345	
Prop RTs		0.155			0.000						0.159	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound			Northbound			Southbound		
LG	TR		L	T					LTR		
So	1900		1900	1900					1900		
Lanes	0 2	0	1	2	0	0	0	0	2	0	
fW	1.000		1.000	1.000					1.000		
fHV	0.980		0.980	0.980					0.980		
fG	1.000		1.000	1.000					1.000		
fP	1.000		1.000	1.000					1.000		
fBB	1.000		1.000	1.000					1.000		
fA	1.000		1.000	1.000					1.000		
fLU	0.952		1.000	0.952					0.952		
fRT	0.977			1.000					0.976		
fLT	1.000		0.950	1.000					0.983		
Sec.											
fLpb	1.000		1.000	1.000					1.000		
fRpb	1.000			1.000					1.000		
S	3464		1770	3547					3403		
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	910	3464	#	0.26	0.31	1089	0.84
Right								
Westbound								
Prot								
Perm								
Left	L	62	1770	#	0.04	0.05	89	0.70
Prot								
Perm								
Thru	T	174	3547		0.05	0.41	1451	0.12
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	1398	3403	#	0.41	0.49	1668	0.84
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.71
Total lost time per cycle, L = 13.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.83

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	0.84	0.31	30.3	1.000	1089	0.37	5.8	0.0	36.1	D	36.1	D
Westbound												
L	0.70	0.05	44.4	1.000	89	0.26	21.2	0.0	65.6	E		
T	0.12	0.41	17.5	1.000	1451	0.11	0.0	0.0	17.5	B	30.1	C
Northbound												
Southbound												

LTR	0.84	0.49	21.0	1.000	1668	0.37	4.0	0.0	24.9	C	24.9	C

Intersection delay = 29.4 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.1 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.1 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.345
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.1 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	32.6	30.3	0.00	0.0	0.0	36.1
	0.0						0.0	
Westbound								
L	0.0	0.00	45.1	44.4	0.00	0.0	0.0	65.6
T	0.0	0.00	28.1	17.5	0.00	0.0	0.0	17.5
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LTR	0.0	0.00	24.3	21.0	0.00	0.0	0.0	24.9
	0.0						0.0	

Intersection Delay 29.4 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup	TR	L T		LTR
Init Queue	0.0	0.0 0.0		0.0
Flow Rate	477	62 91		734
So	1900	1900 1900		1900
No.Lanes	0 2 0	1 2 0	0 0 0	0 2 0
SL	1819	1770 1862		1787
LnCapacity	571	89 762		876
Flow Ratio	0.3	0.0 0.0		0.4
v/c Ratio	0.84	0.70 0.12		0.84
Grn Ratio	0.31	0.05 0.41		0.49
I Factor	1.000	1.000		1.000
AT or PVG	3	3 3		3
Pltn Ratio	1.00	1.00 1.00		1.00
PF2	1.00	1.00 1.00		1.00
Q1	11.7	1.6 1.5		16.8
kB	0.5	0.2 0.6		0.7
Q2	2.2	0.3 0.1		2.9
Q Average	13.9	2.0 1.6		19.7
Q Spacing	25.0	25.0 25.0		25.0
Q Storage	0	0 0		0
Q S Ratio				
70th Percentile Output:				
fB%	1.2	1.2 1.2		1.2
BOQ	16.3	2.3 1.9		22.9
QSRatio				
85th Percentile Output:				
fB%	1.5	1.6 1.6		1.5
BOQ	20.7	3.1 2.5		28.7
QSRatio				
90th Percentile Output:				
fB%	1.6	1.8 1.8		1.5
BOQ	22.2	3.5 2.8		30.5
QSRatio				
95th Percentile Output:				
fB%	1.8	2.0 2.0		1.7
BOQ	24.7	4.0 3.2		33.5
QSRatio				
98th Percentile Output:				
fB%	2.0	2.6 2.6		1.9
BOQ	28.4	5.0 4.1		37.8
QSRatio				

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: SR-55 SB Ramps

Inter.: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
LGConfig		TR		L	T						LTR	
Volume		428	129	224	595					90	555	286
Lane Width		12.0		12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	9.9	5.1	5.0	0.0	21.2	0.0		
Yellow	3.2	4.0	4.0		3.6			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	861	3423	0.68	0.25	22.5	C	22.5	C
Westbound								
L	292	1770	0.81	0.17	39.6	D		
T	1726	3547	0.36	0.49	9.7	A	17.9	B
Northbound								
Southbound								
LTR	1190	3367	0.82	0.35	22.5	C	22.5	C

Intersection Delay = 20.9 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Paularino at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: SR-55 SB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		428	129	224	595					90	555	286
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		113	34	59	157					24	146	75
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900		1900	1900						1900	
ParkExist												
NumPark												
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
LGConfig		TR		L	T						LTR	
Lane Width		12.0		12.0	12.0						12.0	
RTOR Vol			0									0
Adj Flow		587		236	626						980	
%InSharedLn												
Prop LTs		0.000			0.000						0.097	
Prop RTs		0.232			0.000						0.307	
Peds Bikes		0						0			0	
Buses		0		0	0						0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0						0.0	
Arriv. Type		3		3	3						3	
Unit Ext.		3.0		3.0	3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0		2.0	2.0						2.0	
Ext of g		2.0		2.0	2.0						2.0	
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	9.9	5.1	5.0	0.0		21.2	0.0	
Yellow	3.2	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		428	129	224	595					90	555	286
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		451	136	236	626					95	584	301
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
Lane group		TR		L	T						LTR	
Adj flow		587		236	626						980	
Prop LTs		0.000			0.000						0.097	
Prop RTs		0.232			0.000						0.307	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound			Northbound			Southbound		
LG	TR		L	T					LTR		
So	1900		1900	1900					1900		
Lanes	0 2	0	1	2	0	0	0	0	2	0	
fW	1.000		1.000	1.000					1.000		
fHV	0.980		0.980	0.980					0.980		
fG	1.000		1.000	1.000					1.000		
fP	1.000		1.000	1.000					1.000		
fBB	1.000		1.000	1.000					1.000		
fA	1.000		1.000	1.000					1.000		
fLU	0.952		1.000	0.952					0.952		
fRT	0.965			1.000					0.954		
fLT	1.000		0.950	1.000					0.995		
Sec.											
fLpb	1.000		1.000	1.000					1.000		
fRpb	1.000			1.000					1.000		
S	3423		1770	3547					3367		
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	587	3423	#	0.17	0.25	861	0.68
Right								
Westbound								
Prot								
Perm								
Left	L	236	1770	#	0.13	0.17	292	0.81
Prot								
Perm								
Thru	T	626	3547		0.18	0.49	1726	0.36
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	980	3367	#	0.29	0.35	1190	0.82
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.60
Total lost time per cycle, L = 13.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.77

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	0.68	0.25	20.3	1.000	861	0.25	2.2	0.0	22.5	C	22.5	C
Westbound												
L	0.81	0.17	24.1	1.000	292	0.35	15.4	0.0	39.6	D		
T	0.36	0.49	9.6	1.000	1726	0.11	0.1	0.0	9.7	A	17.9	B
Northbound												
Southbound												

LTR 0.82 0.35 17.7 1.000 1190 0.36 4.8 0.0 22.5 C 22.5 C

Intersection delay = 20.9 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.097
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	22.4	20.3	0.00	0.0	0.0	22.5
	0.0						0.0	
Westbound								
L	0.0	0.00	25.0	24.1	0.00	0.0	0.0	39.6
T	0.0	0.00	15.4	9.6	0.00	0.0	0.0	9.7
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LTR	0.0	0.00	19.4	17.7	0.00	0.0	0.0	22.5
	0.0						0.0	

Intersection Delay 20.9 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup	TR	L T		LTR
Init Queue	0.0	0.0 0.0		0.0
Flow Rate	308	236 328		514
So	1900	1900 1900		1900
No.Lanes	0 2 0	1 2 0	0 0 0	0 2 0
SL	1797	1770 1862		1768
LnCapacity	452	292 906		624
Flow Ratio	0.2	0.1 0.2		0.3
v/c Ratio	0.68	0.81 0.36		0.82
Grn Ratio	0.25	0.17 0.49		0.35
I Factor	1.000	1.000		1.000
AT or PVG	3	3 3		3
Pltn Ratio	1.00	1.00 1.00		1.00
PF2	1.00	1.00 1.00		1.00
Q1	4.6	3.8 3.4		7.8
kB	0.3	0.3 0.5		0.4
Q2	0.7	1.0 0.3		1.7
Q Average	5.3	4.7 3.7		9.5
Q Spacing	25.0	25.0 25.0		25.0
Q Storage	0	0 0		0
Q S Ratio				
70th Percentile Output:				
fB%	1.2	1.2 1.2		1.2
BOQ	6.3	5.6 4.4		11.2
QSRatio				
85th Percentile Output:				
fB%	1.6	1.6 1.6		1.5
BOQ	8.3	7.4 5.8		14.4
QSRatio				
90th Percentile Output:				
fB%	1.7	1.7 1.7		1.6
BOQ	9.1	8.1 6.4		15.7
QSRatio				
95th Percentile Output:				
fB%	1.9	2.0 2.0		1.9
BOQ	10.4	9.3 7.3		17.6
QSRatio				
98th Percentile Output:				
fB%	2.4	2.4 2.5		2.2
BOQ	12.6	11.4 9.1		20.7
QSRatio				

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: SR-55 NB Ramps

Inter.: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Volume		1529	606		666	276	987		727			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left A			
Thru	A	A			Thru			
Right	A	A			Right A			
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right A			
SB Right					WB Right A			
Green	17.0	7.1	0.0		20.3	0.0		
Yellow	4.5	4.5			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1750	3547	0.92	0.49	22.4	C	16.1	B
R	1583	1583	0.40	1.00	0.2	A		
Westbound								
T	2503	5074	0.28	0.49	9.0	A	6.4	A
R	1583	1583	0.18	1.00	0.1	A		
Northbound								
L	1163	3437	0.89	0.34	27.9	C		
							16.2	B
R	1583	1583	0.48	1.00	0.2	A		
Southbound								

Intersection Delay = 14.2 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Macarthur at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: SR-55 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1529	606		666	276	987		727			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		402	159		175	73	260		191			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900		1900			
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			
Adj Flow		1609	638		701	291	1039		765			
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0	0	0		0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0		0.0			
Arriv. Type		3	3		3	3	3		3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0		3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0		2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0		2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right	A		
SB Right					WB Right	A		
Green	17.0	7.1	0.0			20.3	0.0	
Yellow	4.5	4.5				3.6		
All Red	1.0	1.0				1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1529	606		666	276	987		727			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		1609	638		701	291	1039		765			
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
Lane group		T	R		T	R	L		R			
Adj flow		1609	638		701	291	1039		765			
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R		L	R				
So	1900	1900		1900	1900		1900	1900				
Lanes	0 2	1	0	3	1	0	2	1	0	0	0	
fW	1.000	1.000		1.000	1.000		1.000	1.000				
fHV	0.980	0.980		0.980	0.980		0.980	0.980				
fG	1.000	1.000		1.000	1.000		1.000	1.000				
fP	1.000	1.000		1.000	1.000		1.000	1.000				
fBB	1.000	1.000		1.000	1.000		1.000	1.000				
fA	1.000	1.000		1.000	1.000		1.000	1.000				
fLU	0.952	1.000		0.908	1.000		0.971	1.000				
fRT	1.000	0.850		1.000	0.850			0.850				
fLT	1.000			1.000			0.950					
Sec.												
fLpb	1.000			1.000			1.000					
fRpb	1.000	1.000		1.000	1.000			1.000				
S	3547	1583		5074	1583		3437	1583				
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1609	3547	#	0.45	0.49	1750	0.92
Right	R	638	1583		0.40	1.00	1583	0.40
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	701	5074		0.14	0.49	2503	0.28
Right	R	291	1583		0.18	1.00	1583	0.18
Northbound								
Prot								
Perm								
Left	L	1039	3437	#	0.30	0.34	1163	0.89
Prot								
Perm								
Thru								
Right	R	765	1583		0.48	1.00	1583	0.48
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.76
Total lost time per cycle, L = 10.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.91

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.92	0.49	14.1	1.000	1750	0.44	8.3	0.0	22.4	C	16.1	B
R	0.40	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Westbound												
T	0.28	0.49	8.9	1.000	2503	0.11	0.1	0.0	9.0	A	6.4	A
R	0.18	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Northbound												
L	0.89	0.34	18.8	1.000	1163	0.42	9.1	0.0	27.9	C		
											16.2	B
R	0.48	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

Intersection delay = 14.2 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	15.2	14.1	0.00	0.0	0.0	22.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
	0.0						0.0	
T	0.0	0.00	15.2	8.9	0.00	0.0	0.0	9.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Northbound								
L	0.0	0.00	19.8	18.8	0.00	0.0	0.0	27.9
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 14.2 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	T	R	T	R	L	R		
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0		
Flow Rate	845	638	257	291	535	765		
So	1900	1900	1900	1900	1900	1900		
No.Lanes	0 2	1	0 3	1	2 0	1	0 0	0
SL	1862	1583	1862	1583	1770	1583		
LnCapacity	919	1583	918	1583	598	1583		
Flow Ratio	0.5	0.4	0.1	0.2	0.3	0.5		
v/c Ratio	0.92	0.40	0.28	0.18	0.89	0.48		
Grn Ratio	0.49	1.00	0.49	1.00	0.34	1.00		
I Factor	1.000		1.000		1.000			
AT or PVG	3	3	3	3	3	3		
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
PF2	1.00		1.00		1.00			
Q1	13.1		2.5		8.5			
kB	0.5	0.7	0.5	0.7	0.4	0.7		
Q2	4.1	0.5	0.2	0.2	2.6	0.7		
Q Average	17.1		2.7		11.0			
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0		
Q Storage	0	0	0	0	0	0		
Q S Ratio								
70th Percentile Output:								
fB%	1.2		1.2		1.2			
BOQ	20.0		3.2		12.9			
QSRatio								
85th Percentile Output:								
fB%	1.5		1.6		1.5			
BOQ	25.2		4.3		16.6			
QSRatio								
90th Percentile Output:								
fB%	1.6		1.7		1.6			
BOQ	26.9		4.8		18.0			
QSRatio								
95th Percentile Output:								
fB%	1.7		2.0		1.8			
BOQ	29.7		5.5		20.1			
QSRatio								
98th Percentile Output:								
fB%	2.0		2.5		2.1			
BOQ	33.7		6.8		23.4			
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: SR-55 NB Ramps

Inter.: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Volume		933	741		1719	1148	656		288			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru				
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right	A	A			EB Right	A			
SB Right					WB Right	A			
Green	16.5	12.1	0.0			15.8	0.0		
Yellow	4.5	4.5				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	2016	3547	0.49	0.57	7.9	A	4.5	A
R	1583	1583	0.49	1.00	0.2	A		
Westbound								
T	2884	5074	0.63	0.57	9.1	A	6.4	A
R	1583	1583	0.76	1.00	2.3	A		
Northbound								
L	905	3437	0.76	0.26	24.3	C		
							16.9	B
R	1583	1583	0.19	1.00	0.1	A		
Southbound								

Intersection Delay = 7.6 (sec/veh) Intersection LOS = A

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Macarthur at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: SR-55 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		933	741		1719	1148	656		288			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		246	195		452	302	173		76			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900		1900			
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			
Adj Flow		982	780		1809	1208	691		303			
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0	0	0		0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0		0.0			
Arriv. Type		3	3		3	3	3		3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0		3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0		2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0		2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right	A		
SB Right					WB Right	A		
Green	16.5	12.1	0.0			15.8	0.0	
Yellow	4.5	4.5				3.6		
All Red	1.0	1.0				1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		933	741		1719	1148	656		288			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		982	780		1809	1208	691		303			
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
Lane group		T	R		T	R	L		R			
Adj flow		982	780		1809	1208	691		303			
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R		L	R				
So	1900	1900		1900	1900		1900	1900				
Lanes	0 2	1	0	3	1	0	2	1	0	0	0	
fW	1.000	1.000		1.000	1.000		1.000	1.000				
fHV	0.980	0.980		0.980	0.980		0.980	0.980				
fG	1.000	1.000		1.000	1.000		1.000	1.000				
fP	1.000	1.000		1.000	1.000		1.000	1.000				
fBB	1.000	1.000		1.000	1.000		1.000	1.000				
fA	1.000	1.000		1.000	1.000		1.000	1.000				
fLU	0.952	1.000		0.908	1.000		0.971	1.000				
fRT	1.000	0.850		1.000	0.850			0.850				
fLT	1.000			1.000			0.950					
Sec.												
fLpb	1.000			1.000			1.000					
fRpb	1.000	1.000		1.000	1.000			1.000				
S	3547	1583		5074	1583		3437	1583				
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	982	3547		0.28	0.57	2016	0.49
Right	R	780	1583		0.49	1.00	1583	0.49
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1809	5074		0.36	0.57	2884	0.63
Right	R	1208	1583	#	0.76	1.00	1583	0.76
Northbound								
Prot								
Perm								
Left	L	691	3437		0.20	0.26	905	0.76
Prot								
Perm								
Thru								
Right	R	303	1583		0.19	1.00	1583	0.19
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.76
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.76

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.49	0.57	7.7	1.000	2016	0.11	0.2	0.0	7.9	A	4.5	A
R	0.49	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Westbound												
T	0.63	0.57	8.7	1.000	2884	0.21	0.4	0.0	9.1	A	6.4	A
R	0.76	1.00	0.0	0.950	1583	0.32	2.3	0.0	2.3	A		
Northbound												
L	0.76	0.26	20.4	1.000	905	0.32	3.9	0.0	24.3	C		
											16.9	B
R	0.19	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

Intersection delay = 7.6 (sec/veh) Intersection LOS = A

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	12.9	7.7	0.00	0.0	0.0	7.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
	0.0						0.0	
T	0.0	0.00	12.9	8.7	0.00	0.0	0.0	9.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.3
Northbound								
L	0.0	0.00	22.1	20.4	0.00	0.0	0.0	24.3
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 7.6 sec/veh Intersection LOS A

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	T	R	T	R	L	R		
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0		
Flow Rate	515	780	664	1208	355	303		
So	1900	1900	1900	1900	1900	1900		
No.Lanes	0 2	1	0 3	1	2 0	1	0 0	0
SL	1862	1583	1862	1583	1770	1583		
LnCapacity	1058	1583	1058	1583	466	1583		
Flow Ratio	0.3	0.5	0.4	0.8	0.2	0.2		
v/c Ratio	0.49	0.49	0.63	0.76	0.76	0.19		
Grn Ratio	0.57	1.00	0.57	1.00	0.26	1.00		
I Factor	1.000		1.000		1.000			
AT or PVG	3	3	3	3	3	3		
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
PF2	1.00		1.00		1.00			
Q1	5.1		7.4		5.5			
kB	0.6	0.7	0.6	0.7	0.3	0.7		
Q2	0.5	0.7	0.9	2.2	1.0	0.2		
Q Average	5.6		8.4		6.5			
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0		
Q Storage	0	0	0	0	0	0		
Q S Ratio								
70th Percentile Output:								
fB%	1.2		1.2		1.2			
BOQ	6.7		9.9		7.7			
QSRatio								
85th Percentile Output:								
fB%	1.5		1.5		1.5			
BOQ	8.7		12.8		10.0			
QSRatio								
90th Percentile Output:								
fB%	1.7		1.7		1.7			
BOQ	9.6		13.9		10.9			
QSRatio								
95th Percentile Output:								
fB%	1.9		1.9		1.9			
BOQ	10.9		15.7		12.4			
QSRatio								
98th Percentile Output:								
fB%	2.3		2.2		2.3			
BOQ	13.3		18.6		14.9			
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: SR-55 SB Ramps

Inter.: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Volume		1337	698		1282	139				993		905
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	12.9	8.7	0.0		22.9	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1602	3547	0.88	0.45	20.9	C	13.8	B
R	1583	1583	0.46	1.00	0.2	A		
Westbound								
T	2292	5074	0.59	0.45	12.7	B	11.5	B
R	1583	1583	0.09	1.00	0.0+	A		
Northbound								
Southbound								
L	1312	3437	0.80	0.38	20.0+	C		
							23.3	C
R	1070	2803	0.89	0.38	26.9	C		

Intersection Delay = 16.5 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Macarthur at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: SR-55 SB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1337	698		1282	139				993		905
% Heavy Veh		2	2		2	2				2		2
PHF		0.95	0.95		0.95	0.95				0.95		0.95
PK 15 Vol		352	184		337	37				261		238
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900		1900	1900				1900		1900
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
LGConfig		T	R		T	R				L		R
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0
Adj Flow		1407	735		1349	146				1045		953
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000
Peds Bikes	0			0			0			0		
Buses		0	0		0	0				0		0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0				0.0		0.0
Arriv. Type		3	3		3	3				3		3
Unit Ext.		3.0	3.0		3.0	3.0				3.0		3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0		2.0	2.0				2.0		2.0
Ext of g		2.0	2.0		2.0	2.0				2.0		2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	12.9	8.7	0.0		22.9	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1337	698		1282	139				993		905
PHF		0.95	0.95		0.95	0.95				0.95		0.95
Adj flow		1407	735		1349	146				1045		953
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
Lane group		T	R		T	R				L		R
Adj flow		1407	735		1349	146				1045		953
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R					L		R
So	1900	1900		1900	1900					1900		1900
Lanes	0 2	1	0	3	1	0	0	0		2	0	2
fW	1.000	1.000		1.000	1.000					1.000		1.000
fHV	0.980	0.980		0.980	0.980					0.980		0.980
fG	1.000	1.000		1.000	1.000					1.000		1.000
fP	1.000	1.000		1.000	1.000					1.000		1.000
fBB	1.000	1.000		1.000	1.000					1.000		1.000
fA	1.000	1.000		1.000	1.000					1.000		1.000
fLU	0.952	1.000		0.908	1.000					0.971		0.885
fRT	1.000	0.850		1.000	0.850							0.850
fLT	1.000			1.000						0.950		
Sec.												
fLpb	1.000			1.000						1.000		
fRpb	1.000	1.000		1.000	1.000							1.000
S	3547	1583		5074	1583					3437		2803
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1407	3547	#	0.40	0.45	1602	0.88
Right	R	735	1583		0.46	1.00	1583	0.46
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1349	5074		0.27	0.45	2292	0.59
Right	R	146	1583		0.09	1.00	1583	0.09
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	1045	3437		0.30	0.38	1312	0.80
Prot								
Perm								
Thru								
Right	R	953	2803	#	0.34	0.38	1070	0.89

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.74
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.88

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.88	0.45	15.0	1.000	1602	0.41	5.9	0.0	20.9	C	13.8	B
R	0.46	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Westbound												
T	0.59	0.45	12.3	1.000	2292	0.18	0.4	0.0	12.7	B	11.5	B
R	0.09	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Northbound												
Southbound												
L	0.80	0.38	16.5	1.000	1312	0.34	3.5	0.0	20.0+	C		

									23.3	C
R	0.89	0.38	17.4	1.000	1070	0.41	9.5	0.0	26.9	C

Intersection delay = 16.5 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000	0.000		
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	16.5	15.0	0.00	0.0	0.0	20.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
	0.0						0.0	
T	0.0	0.00	16.5	12.3	0.00	0.0	0.0	12.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
L	0.0	0.00	18.5	16.5	0.00	0.0	0.0	20.0+
	0.0						0.0	
R	0.0	0.00	18.5	17.4	0.00	0.0	0.0	26.9

Intersection Delay 16.5 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound			Southbound		
LaneGroup	T	R	T	R				L		R
Init Queue	0.0	0.0	0.0	0.0				0.0		0.0
Flow Rate	738	735	495	146				538		538
So	1900	1900	1900	1900				1900		1900
No.Lanes	0 2	1	0 3	1	0	0	0	2	0	2
SL	1862	1583	1862	1583				1770		1584
LnCapacity	841	1583	841	1583				675		604
Flow Ratio	0.4	0.5	0.3	0.1				0.3		0.3
v/c Ratio	0.88	0.46	0.59	0.09				0.80		0.89
Grn Ratio	0.45	1.00	0.45	1.00				0.38		0.38
I Factor	1.000		1.000					1.000		
AT or PVG	3	3	3	3				3		3
Pltn Ratio	1.00	1.00	1.00	1.00				1.00		1.00
PF2	1.00		1.00					1.00		1.00
Q1	11.2		6.2					8.0		8.4
kB	0.5	0.7	0.5	0.7				0.4		0.4
Q2	2.9	0.6	0.7	0.1				1.5		2.5
Q Average	14.0		6.8					9.5		10.9
Q Spacing	25.0	25.0	25.0	25.0				25.0		25.0
Q Storage	0	0	0	0				0		0
Q S Ratio										
70th Percentile Output:										
fB%	1.2		1.2					1.2		1.2
BOQ	16.4		8.1					11.2		12.8
QSRatio										
85th Percentile Output:										
fB%	1.5		1.5					1.5		1.5
BOQ	20.9		10.5					14.4		16.4
QSRatio										
90th Percentile Output:										
fB%	1.6		1.7					1.6		1.6
BOQ	22.4		11.5					15.7		17.8
QSRatio										
95th Percentile Output:										
fB%	1.8		1.9					1.9		1.8
BOQ	24.9		13.1					17.6		19.9
QSRatio										
98th Percentile Output:										
fB%	2.0		2.3					2.2		2.1
BOQ	28.6		15.7					20.7		23.2
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: SR-55 SB Ramps

Inter.: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Volume		1246	947		1768	672				355		739
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	17.1	7.5	0.0		19.9	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1779	3547	0.74	0.50	13.5	B	8.0	A
R	1583	1583	0.63	1.00	0.8	A		
Westbound								
T	2545	5074	0.73	0.50	12.9	B	9.4	A
R	1583	1583	0.45	1.00	0.2	A		
Northbound								
Southbound								
L	1140	3437	0.33	0.33	15.2	B		
							22.0	C
R	930	2803	0.84	0.33	25.3	C		

Intersection Delay = 11.3 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: PM
Intersection: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2008
Project ID: IBC Vision Traffic Study - Existing With Project

E/W St: SR-55 SB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1246	947		1768	672				355		739
% Heavy Veh		2	2		2	2				2		2
PHF		0.95	0.95		0.95	0.95				0.95		0.95
PK 15 Vol		328	249		465	177				93		194
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900		1900	1900				1900		1900
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
LGConfig		T	R		T	R				L		R
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0
Adj Flow		1312	997		1861	707				374		778
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000
Peds Bikes	0			0			0			0		
Buses		0	0		0	0				0		0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0				0.0		0.0
Arriv. Type		3	3		3	3				3		3
Unit Ext.		3.0	3.0		3.0	3.0				3.0		3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0		2.0	2.0				2.0		2.0
Ext of g		2.0	2.0		2.0	2.0				2.0		2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	17.1	7.5	0.0		19.9	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1246	947		1768	672				355		739
PHF		0.95	0.95		0.95	0.95				0.95		0.95
Adj flow		1312	997		1861	707				374		778
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
Lane group		T	R		T	R				L		R
Adj flow		1312	997		1861	707				374		778
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R					L		R
So	1900	1900		1900	1900					1900		1900
Lanes	0 2	1	0	3	1	0	0	0		2	0	2
fW	1.000	1.000		1.000	1.000					1.000		1.000
fHV	0.980	0.980		0.980	0.980					0.980		0.980
fG	1.000	1.000		1.000	1.000					1.000		1.000
fP	1.000	1.000		1.000	1.000					1.000		1.000
fBB	1.000	1.000		1.000	1.000					1.000		1.000
fA	1.000	1.000		1.000	1.000					1.000		1.000
fLU	0.952	1.000		0.908	1.000					0.971		0.885
fRT	1.000	0.850		1.000	0.850							0.850
fLT	1.000			1.000						0.950		
Sec.												
fLpb	1.000			1.000						1.000		
fRpb	1.000	1.000		1.000	1.000							1.000
S	3547	1583		5074	1583					3437		2803
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1312	3547	#	0.37	0.50	1779	0.74
Right	R	997	1583		0.63	1.00	1583	0.63
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1861	5074		0.37	0.50	2545	0.73
Right	R	707	1583		0.45	1.00	1583	0.45
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	374	3437		0.11	0.33	1140	0.33
Prot								
Perm								
Thru								
Right	R	778	2803	#	0.28	0.33	930	0.84

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.65
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.78

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.74	0.50	11.8	1.000	1779	0.30	1.7	0.0	13.5	B	8.0	A
R	0.63	1.00	0.0	0.950	1583	0.21	0.8	0.0	0.8	A		
Westbound												
T	0.73	0.50	11.8	1.000	2545	0.29	1.1	0.0	12.9	B	9.4	A
R	0.45	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Northbound												
Southbound												
L	0.33	0.33	15.0	1.000	1140	0.11	0.2	0.0	15.2	B		

										22.0	C
R	0.84	0.33	18.5	1.000	930	0.37	6.8	0.0	25.3	C	

Intersection delay = 11.3 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000	0.000		
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	14.9	11.8	0.00	0.0	0.0	13.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.8
Westbound								
	0.0						0.0	
T	0.0	0.00	14.9	11.8	0.00	0.0	0.0	12.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
L	0.0	0.00	20.1	15.0	0.00	0.0	0.0	15.2
	0.0						0.0	
R	0.0	0.00	20.1	18.5	0.00	0.0	0.0	25.3

Intersection Delay 11.3 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound			Southbound		
LaneGroup	T	R	T	R				L		R
Init Queue	0.0	0.0	0.0	0.0				0.0		0.0
Flow Rate	689	997	683	707				192		439
So	1900	1900	1900	1900				1900		1900
No.Lanes	0 2	1	0 3	1	0	0	0	2	0	2
SL	1862	1583	1862	1583				1770		1584
LnCapacity	934	1583	934	1583				587		525
Flow Ratio	0.4	0.6	0.4	0.4				0.1		0.3
v/c Ratio	0.74	0.63	0.73	0.45				0.33		0.84
Grn Ratio	0.50	1.00	0.50	1.00				0.33		0.33
I Factor	1.000		1.000					1.000		
AT or PVG	3	3	3	3				3		3
Pltn Ratio	1.00	1.00	1.00	1.00				1.00		1.00
PF2	1.00		1.00					1.00		1.00
Q1	9.1		9.0					2.4		6.8
kB	0.5	0.7	0.5	0.7				0.4		0.4
Q2	1.4	1.2	1.4	0.6				0.2		1.6
Q Average	10.5		10.3					2.6		8.4
Q Spacing	25.0	25.0	25.0	25.0				25.0		25.0
Q Storage	0	0	0	0				0		0
Q S Ratio										
70th Percentile Output:										
fB%	1.2		1.2					1.2		1.2
BOQ	12.3		12.1					3.1		9.9
QSRatio										
85th Percentile Output:										
fB%	1.5		1.5					1.6		1.5
BOQ	15.8		15.6					4.1		12.8
QSRatio										
90th Percentile Output:										
fB%	1.6		1.6					1.8		1.7
BOQ	17.2		16.9					4.5		14.0
QSRatio										
95th Percentile Output:										
fB%	1.8		1.8					2.0		1.9
BOQ	19.2		19.0					5.2		15.8
QSRatio										
98th Percentile Output:										
fB%	2.1		2.2					2.5		2.2
BOQ	22.5		22.2					6.5		18.7
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: SR-55 NB Ramps

Inter.: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Dyer Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	3	1	0	3	0	1	0	1	0	0	0
LGConfig		T	R		TR		L	LR	R			
Volume		1944	551		1053	395	815		714			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left A			
Thru	A	A			Thru			
Right	A	A			Right A			
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right A			
SB Right					WB Right			
Green	22.3	12.8	0.0		45.3	0.0		
Yellow	4.0	4.0			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	2142	5074	0.96	0.42	37.4	D	29.2	C
R	1583	1583	0.37	1.00	0.1	A		
Westbound								
TR	2054	4866	0.74	0.42	24.6	C	24.6	C
Northbound								
L	844	1770	1.02	0.48	60.0	E		
LR	888	1863	0.00	0.48	13.0	B	58.4	E
R	755	1583	1.00	0.48	56.5	E		
Southbound								

Intersection Delay = 36.1 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Dyer at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: SR-55 NB Ramps N/S St: Dyer Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1944	551		1053	395	815		714			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		512	145		277	104	214		188			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900		1900	1900	1900			
ParkExist												
NumPark												
No. Lanes	0	3	1	0	3	0	1	0	1	0	0	0
LGConfig		T	R		TR		L	LR	R			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol		0			0			0				
Adj Flow		2046	580		1524		858	0	752			
%InSharedLn							0		0			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.273			0.000	1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0		0	0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0		0.0	0.0	0.0			
Arriv. Type		3	3		3		3	3	3			
Unit Ext.		3.0	3.0		3.0		3.0	3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0		2.0	2.0	2.0			
Ext of g		2.0	2.0		2.0		2.0	2.0	2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right			
Green	22.3	12.8	0.0		45.3	0.0		
Yellow	4.0	4.0			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1944	551		1053	395	815		714			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		2046	580		1108	416	858		752			
No. Lanes	0	3	1	0	3	0	1	0	1	0	0	0
Lane group		T	R		TR		L	LR	R			
Adj flow		2046	580		1524		858	0	752			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.273			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		TR			L	LR	R			
So	1900	1900		1900			1900	1900	1900			
Lanes	0 3	0 1	0	0 3	0		0 1	0	0 1	0	0	0
fW	1.000	1.000		1.000			1.000	1.000	1.000			
fHV	0.980	0.980		0.980			0.980	0.980	0.980			
fG	1.000	1.000		1.000			1.000	1.000	1.000			
fP	1.000	1.000		1.000			1.000	1.000	1.000			
fBB	1.000	1.000		1.000			1.000	1.000	1.000			
fA	1.000	1.000		1.000			1.000	1.000	1.000			
fLU	0.908	1.000		0.908			1.000	1.000	1.000			
fRT	1.000	0.850		0.959				1.000	0.850			
fLT	1.000			1.000			0.950	1.000				
Sec.												
fLpb	1.000			1.000			1.000	1.000				
fRpb	1.000	1.000		1.000				1.000	1.000			
S	5074	1583		4866			1770	1863	1583			
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2046	5074	#	0.40	0.42	2142	0.96
Right	R	580	1583		0.37	1.00	1583	0.37
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1524	4866		0.31	0.42	2054	0.74
Right								
Northbound								
Prot								
Perm								
Left	L	858	1770	#	0.48	0.48	844	1.02
Prot								
Perm								
Thru	LR	0	1863		0.00	0.48	888	0.00
Right	R	752	1583		0.48	0.48	755	1.00
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.89
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.99

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.96	0.42	26.6	1.000	2142	0.47	10.8	0.0	37.4	D	29.2	C
R	0.37	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Westbound												
TR	0.74	0.42	23.1	1.000	2054	0.30	1.5	0.0	24.6	C	24.6	C
Northbound												
L	1.02	0.48	24.8	1.000	844	0.50	35.2	0.0	60.0	E		
LR	0.00	0.48	13.0	1.000	888	0.11	0.0	0.0	13.0	B	58.4	E
R	1.00	0.48	24.8	1.000	755	0.50	31.7	0.0	56.5	E		
Southbound												

Intersection delay = 36.1 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	27.4	26.6	0.00	0.0	0.0	37.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Westbound								
	0.0						0.0	
TR	0.0	0.00	27.4	23.1	0.00	0.0	0.0	24.6
	0.0						0.0	
Northbound								
L	0.0	0.00	24.8	24.8	0.00	3.5	0.0	60.0
LR	0.0	0.00	24.8	13.0	0.00	0.0	0.0	13.0
R	0.0	0.00	24.8	24.8	0.00	0.0	0.0	56.5
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 36.1 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound	Northbound			Southbound
LaneGroup	T	R	TR	L	LR	R	
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate	751	580	559	858	0	752	
So	1900	1900	1900	1900	1900	1900	
No.Lanes	0 3	1	0 3 0	1	0	1	0 0 0
SL	1862	1583	1786	1770	1863	1583	
LnCapacity	786	1583	754	844	888	755	
Flow Ratio	0.4	0.4	0.3	0.5	0.0	0.5	
v/c Ratio	0.96	0.37	0.74	1.02	0.00	1.00	
Grn Ratio	0.42	1.00	0.42	0.48	0.48	0.48	
I Factor	1.000		1.000		1.000		
AT or PVG	3	3	3	3	3	3	
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF2	1.00		1.00	1.00	1.00	1.00	
Q1	19.2		12.4	22.6	0.0	19.8	
kB	0.6	0.9	0.6	0.6	0.7	0.6	
Q2	5.7	0.5	1.6	9.2	0.0	7.3	
Q Average	24.9		14.0	31.9	0.0	27.1	
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage	0	0	0	0	0	0	
Q S Ratio							
70th Percentile Output:							
fB%	1.2		1.2	1.1	1.2	1.2	
BOQ	28.8		16.4	36.5	0.0	31.2	
QSRatio							
85th Percentile Output:							
fB%	1.4		1.5	1.4	1.6	1.4	
BOQ	35.7		20.9	44.7	0.0	38.5	
QSRatio							
90th Percentile Output:							
fB%	1.5		1.6	1.5	1.8	1.5	
BOQ	37.8		22.4	47.2	0.0	40.7	
QSRatio							
95th Percentile Output:							
fB%	1.7		1.8	1.6	2.1	1.6	
BOQ	41.1		24.9	51.1	0.0	44.3	
QSRatio							
98th Percentile Output:							
fB%	1.8		2.0	1.8	2.7	1.8	
BOQ	46.0		28.6	56.9	0.0	49.5	
QSRatio							

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency:
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: SR-55 NB Ramps

Inter.: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Dyer Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	3	1	0	3	0	1	0	1	0	0	0
LGConfig		T	R		TR		L	LR	R			
Volume		1109	1023		1653	1211	219		88			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left A			
Thru	A	A			Thru			
Right	A	A			Right A			
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right A			
SB Right					WB Right			
Green	24.8	33.0	0.0		12.5	0.0		
Yellow	4.0	4.0			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 84.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	3753	5074	0.31	0.74	3.8	A	2.5	A
R	1583	1583	0.68	1.00	1.2	A		
Westbound								
TR	3515	4752	0.86	0.74	10.2	B	10.2	B
Northbound								
L	261	1770	0.89	0.15	63.7	E		
LR	274	1863	0.00	0.15	30.9	C	55.2	E
R	233	1583	0.40	0.15	33.9	C		
Southbound								

Intersection Delay = 9.7 (sec/veh) Intersection LOS = A

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.:
Date Performed: 11/17/09
Analysis Time Period: PM
Intersection: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2008
Project ID: IBC Vision Traffic Study - Existing With Project

E/W St: SR-55 NB Ramps N/S St: Dyer Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1109	1023		1653	1211	219		88			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		292	269		435	319	58		23			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900		1900	1900	1900			
ParkExist												
NumPark												
No. Lanes	0	3	1	0	3	0	1	0	1	0	0	0
LGConfig		T	R		TR		L	LR	R			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			
Adj Flow		1167	1077		3015		231	0	93			
%InSharedLn							0		0			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.423			0.000	1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0		0	0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0		0.0	0.0	0.0			
Arriv. Type		3	3		3		3	3	3			
Unit Ext.		3.0	3.0		3.0		3.0	3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0		2.0	2.0	2.0			
Ext of g		2.0	2.0		2.0		2.0	2.0	2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right			
Green	24.8	33.0	0.0		12.5	0.0		
Yellow	4.0	4.0			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 84.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1109	1023		1653	1211	219		88			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		1167	1077		1740	1275	231		93			
No. Lanes	0	3	1	0	3	0	1	0	1	0	0	0
Lane group		T	R		TR		L	LR	R			
Adj flow		1167	1077		3015		231	0	93			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.423			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound		Northbound			Southbound		
LG	T	R		TR		L	LR	R			
So	1900	1900		1900		1900	1900	1900			
Lanes	0 3	1	0	3	0	1	0	1	0	0	0
fW	1.000	1.000		1.000		1.000	1.000	1.000			
fHV	0.980	0.980		0.980		0.980	0.980	0.980			
fG	1.000	1.000		1.000		1.000	1.000	1.000			
fP	1.000	1.000		1.000		1.000	1.000	1.000			
fBB	1.000	1.000		1.000		1.000	1.000	1.000			
fA	1.000	1.000		1.000		1.000	1.000	1.000			
fLU	0.908	1.000		0.908		1.000	1.000	1.000			
fRT	1.000	0.850		0.937			1.000	0.850			
fLT	1.000			1.000		0.950	1.000				
Sec.											
fLpb	1.000			1.000		1.000	1.000				
fRpb	1.000	1.000		1.000			1.000	1.000			
S	5074	1583		4752		1770	1863	1583			
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1167	5074		0.23	0.74	3753	0.31
Right	R	1077	1583		0.68	1.00	1583	0.68
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	3015	4752	#	0.63	0.74	3515	0.86
Right								
Northbound								
Prot								
Perm								
Left	L	231	1770	#	0.13	0.15	261	0.89
Prot								
Perm								
Thru	LR	0	1863		0.00	0.15	274	0.00
Right	R	93	1583		0.06	0.15	233	0.40
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.76
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.86

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.31	0.74	3.7	1.000	3753	0.11	0.0	0.0	3.8	A	2.5	A
R	0.68	1.00	0.0	0.950	1583	0.25	1.2	0.0	1.2	A		
Westbound												
TR	0.86	0.74	7.9	1.000	3515	0.39	2.3	0.0	10.2	B	10.2	B
Northbound												
L	0.89	0.15	35.5	1.000	261	0.41	28.2	0.0	63.7	E		
LR	0.00	0.15	30.9	1.000	274	0.11	0.0	0.0	30.9	C	55.2	E
R	0.40	0.15	32.8	1.000	233	0.11	1.1	0.0	33.9	C		
Southbound												

Intersection delay = 9.7 (sec/veh) Intersection LOS = A

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	84.9 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	84.9 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	84.9 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	11.1	3.7	0.00	0.0	0.0	3.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.2
Westbound								
	0.0						0.0	
TR	0.0	0.00	11.1	7.9	0.00	0.0	0.0	10.2
	0.0						0.0	
Northbound								
L	0.0	0.00	36.2	35.5	0.00	0.0	0.0	63.7
LR	0.0	0.00	36.2	30.9	0.00	0.0	0.0	30.9
R	0.0	0.00	36.2	32.8	0.00	0.0	0.0	33.9
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 9.7 sec/veh Intersection LOS A

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound	Northbound			Southbound
LaneGroup	T	R	TR	L	LR	R	
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate	428	1077	1106	231	0	93	
So	1900	1900	1900	1900	1900	1900	
No.Lanes	0 3	1	0 3 0	1	0	1	0 0 0
SL	1862	1583	1744	1770	1863	1583	
LnCapacity	1377	1583	1290	261	274	233	
Flow Ratio	0.2	0.7	0.6	0.1	0.0	0.1	
v/c Ratio	0.31	0.68	0.86	0.89	0.00	0.40	
Grn Ratio	0.74	1.00	0.74	0.15	0.15	0.15	
I Factor	1.000		1.000		1.000		
AT or PVG	3	3	3	3	3	3	
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF2	1.00		1.00	1.00	1.00	1.00	
Q1	3.4		18.6	5.3	0.0	2.0	
kB	0.8	0.9	0.8	0.3	0.3	0.3	
Q2	0.4	1.8	4.0	1.6	0.0	0.2	
Q Average	3.8		22.5	6.9	0.0	2.2	
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage	0	0	0	0	0	0	
Q S Ratio							
70th Percentile Output:							
fB%	1.2		1.2	1.2	1.2	1.2	
BOQ	4.5		26.1	8.2	0.0	2.6	
QSRatio							
85th Percentile Output:							
fB%	1.6		1.4	1.5	1.6	1.6	
BOQ	5.9		32.5	10.7	0.0	3.4	
QSRatio							
90th Percentile Output:							
fB%	1.7		1.5	1.7	1.8	1.8	
BOQ	6.5		34.5	11.7	0.0	3.8	
QSRatio							
95th Percentile Output:							
fB%	2.0		1.7	1.9	2.1	2.0	
BOQ	7.5		37.7	13.3	0.0	4.4	
QSRatio							
98th Percentile Output:							
fB%	2.4		1.9	2.3	2.7	2.5	
BOQ	9.2		42.3	15.9	0.0	5.5	
QSRatio							

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: SR-55 SB Ramps

Inter.: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Grand Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Volume				352		367		883			623	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	20.3	0.0			18.0	6.2	0.0	
Yellow	3.6				4.0	4.0		
All Red	1.0				1.0	1.9		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
Westbound								
L	599	1770	0.62	0.34	18.6	B		
							20.4	C
R	536	1583	0.72	0.34	22.1	C		
Northbound								
T	1726	3547	0.54	0.49	11.1	B	11.1	B
Southbound								
T	2469	5074	0.27	0.49	9.1	A	9.1	A

Intersection Delay = 13.5 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Grand at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2008
Project ID:	IBC Vision Traffic Study - Existing With Project

E/W St: SR-55 SB Ramps N/S St: Grand Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				352		367		883			623	
% Heavy Veh				2		2		2			2	
PHF				0.95		0.95		0.95			0.95	
PK 15 Vol				93		97		232			164	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900			1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						
Adj Flow				371		386		929			656	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	
Peds Bikes	0			0								
Buses				0		0		0			0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0			0.0	
Arriv. Type				3		3		3			3	
Unit Ext.				3.0		3.0		3.0			3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0			2.0	
Ext of g				2.0		2.0		2.0			2.0	
Ped Min g		3.2			3.2							

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right				
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green		20.3	0.0			18.0	6.2	0.0	
Yellow		3.6				4.0	4.0		
All Red		1.0				1.0	1.9		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				352		367		883			623	
PHF				0.95		0.95		0.95			0.95	
Adj flow				371		386		929			656	
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
Lane group				L		R		T			T	
Adj flow				371		386		929			656	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T			T		
So			1900		1900		1900			1900		
Lanes	0	0	1	0	1	0	2	0	0	3	0	
fW			1.000		1.000		1.000			1.000		
fHV			0.980		0.980		0.980			0.980		
fG			1.000		1.000		1.000			1.000		
fP			1.000		1.000		1.000			1.000		
fBB			1.000		1.000		1.000			1.000		
fA			1.000		1.000		1.000			1.000		
fLU			1.000		1.000		0.952			0.908		
fRT					0.850		1.000			1.000		
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000			1.000		
S			1770		1583		3547			5074		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	371	1770		0.21	0.34	599	0.62
Prot								
Perm								
Thru								
Right	R	386	1583	#	0.24	0.34	536	0.72
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	929	3547	#	0.26	0.49	1726	0.54
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	656	5074		0.13	0.49	2469	0.27
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.51
Total lost time per cycle, L = 10.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.61

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.62	0.34	16.6	1.000	599	0.20	2.0	0.0	18.6	B		
											20.4	C
R	0.72	0.34	17.4	1.000	536	0.28	4.7	0.0	22.1	C		
Northbound												
T	0.54	0.49	10.7	1.000	1726	0.14	0.3	0.0	11.1	B	11.1	B
Southbound												

T 0.27 0.49 9.1 1.000 2469 0.11 0.1 0.0 9.1 A 9.1 A

Intersection delay = 13.5 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.9	16.6	0.00	0.0	0.0	18.6
	0.0						0.0	
R	0.0	0.00	19.9	17.4	0.00	0.0	0.0	22.1
Northbound								
	0.0						0.0	
T	0.0	0.00	15.4	10.7	0.00	0.0	0.0	11.1
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	15.4	9.1	0.00	0.0	0.0	9.1
	0.0						0.0	

Intersection Delay 13.5 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound		Northbound	Southbound
LaneGroup		L	R	T	T
Init Queue		0.0	0.0	0.0	0.0
Flow Rate		371	386	487	240
So		1900	1900	1900	1900
No.Lanes	0 0 0	1 0	1	0 2 0	0 3 0
SL		1770	1583	1862	1862
LnCapacity		599	536	906	906
Flow Ratio		0.2	0.2	0.3	0.1
v/c Ratio		0.62	0.72	0.54	0.26
Grn Ratio		0.34	0.34	0.49	0.49
I Factor		1.000		1.000	1.000
AT or PVG		3	3	3	3
Pltn Ratio		1.00	1.00	1.00	1.00
PF2		1.00	1.00	1.00	1.00
Q1		5.2	5.6	5.6	2.4
kB		0.4	0.4	0.5	0.5
Q2		0.6	0.9	0.6	0.2
Q Average		5.8	6.5	6.2	2.5
Q Spacing		25.0	25.0	25.0	25.0
Q Storage		0	0	0	0
Q S Ratio					
70th Percentile Output:					
fB%		1.2	1.2	1.2	1.2
BOQ		6.9	7.7	7.4	3.0
QSRatio					
85th Percentile Output:					
fB%		1.5	1.5	1.5	1.6
BOQ		9.0	10.1	9.6	4.0
QSRatio					
90th Percentile Output:					
fB%		1.7	1.7	1.7	1.8
BOQ		9.9	11.0	10.5	4.5
QSRatio					
95th Percentile Output:					
fB%		1.9	1.9	1.9	2.0
BOQ		11.2	12.5	12.0	5.1
QSRatio					
98th Percentile Output:					
fB%		2.3	2.3	2.3	2.5
BOQ		13.6	15.1	14.4	6.4
QSRatio					

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency:
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Existing With Project
E/W St: SR-55 SB Ramps

Inter.: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2008
N/S St: Grand Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Volume				328		245		790			733	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	18.1	0.0			15.0	11.4	0.0	
Yellow	3.6				4.0	4.0		
All Red	1.0				1.0	1.9		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	534	1770	0.65	0.30	20.9	C	20.0-	B
R	478	1583	0.54	0.30	18.7	B		
Northbound								
T	1856	3547	0.45	0.52	9.1	A	9.1	A
Southbound								
T	2655	5074	0.29	0.52	8.1	A	8.1	A

Intersection Delay = 11.7 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.:
Date Performed: 11/17/09
Analysis Time Period: PM
Intersection: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2008
Project ID: IBC Vision Traffic Study - Existing With Project

E/W St: SR-55 SB Ramps N/S St: Grand Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				328		245		790			733	
% Heavy Veh				2		2		2			2	
PHF				0.95		0.95		0.95			0.95	
PK 15 Vol				86		64		208			193	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900			1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						
Adj Flow				345		258		832			772	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	
Peds Bikes	0			0								
Buses				0		0		0			0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0			0.0	
Arriv. Type				3		3		3			3	
Unit Ext.				3.0		3.0		3.0			3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0			2.0	
Ext of g				2.0		2.0		2.0			2.0	
Ped Min g		3.2			3.2							

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		18.1	0.0			15.0	11.4	0.0
Yellow		3.6				4.0	4.0	
All Red		1.0				1.0	1.9	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				328		245		790			733	
PHF				0.95		0.95		0.95			0.95	
Adj flow				345		258		832			772	
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
Lane group				L		R		T			T	
Adj flow				345		258		832			772	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T			T		
So			1900		1900		1900			1900		
Lanes	0	0	1	0	1	0	2	0	0	3	0	
fW			1.000		1.000		1.000			1.000		
fHV			0.980		0.980		0.980			0.980		
fG			1.000		1.000		1.000			1.000		
fP			1.000		1.000		1.000			1.000		
fBB			1.000		1.000		1.000			1.000		
fA			1.000		1.000		1.000			1.000		
fLU			1.000		1.000		0.952			0.908		
fRT					0.850		1.000			1.000		
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000			1.000		
S			1770		1583		3547			5074		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	345	1770	#	0.19	0.30	534	0.65
Prot								
Perm								
Thru								
Right	R	258	1583		0.16	0.30	478	0.54
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	832	3547	#	0.23	0.52	1856	0.45
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	772	5074		0.15	0.52	2655	0.29
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.43
Total lost time per cycle, L = 10.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.52

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.65	0.30	18.2	1.000	534	0.22	2.7	0.0	20.9	C		
											20.0-	B
R	0.54	0.30	17.5	1.000	478	0.14	1.2	0.0	18.7	B		
Northbound												
T	0.45	0.52	8.9	1.000	1856	0.11	0.2	0.0	9.1	A	9.1	A
Southbound												

T 0.29 0.52 8.0 1.000 2655 0.11 0.1 0.0 8.1 A 8.1 A

Intersection delay = 11.7 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				

EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	20.9	18.2	0.00	0.0	0.0	20.9
	0.0						0.0	
R	0.0	0.00	20.9	17.5	0.00	0.0	0.0	18.7
Northbound								
	0.0						0.0	
T	0.0	0.00	14.3	8.9	0.00	0.0	0.0	9.1
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	14.3	8.0	0.00	0.0	0.0	8.1
	0.0						0.0	

Intersection Delay 11.7 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound			Southbound		
LaneGroup				L	R	T			T		
Init Queue				0.0	0.0	0.0			0.0		
Flow Rate				345	258	436			283		
So				1900	1900	1900			1900		
No.Lanes	0	0	0	1	1	0	2	0	0	3	0
SL				1770	1583	1862			1862		
LnCapacity				534	478	974			974		
Flow Ratio				0.2	0.2	0.2			0.2		
v/c Ratio				0.65	0.54	0.45			0.29		
Grn Ratio				0.30	0.30	0.52			0.52		
I Factor				1.000		1.000			1.000		
AT or PVG				3	3	3			3		
Pltn Ratio				1.00	1.00	1.00			1.00		
PF2				1.00	1.00	1.00			1.00		
Q1				5.0	3.6	4.5			2.7		
kB				0.4	0.3	0.5			0.5		
Q2				0.7	0.4	0.4			0.2		
Q Average				5.6	4.0	5.0			2.9		
Q Spacing				25.0	25.0	25.0			25.0		
Q Storage				0	0	0			0		
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2	1.2			1.2		
BOQ				6.7	4.7	5.9			3.4		
QSRatio											
85th Percentile Output:											
fB%				1.5	1.6	1.6			1.6		
BOQ				8.7	6.2	7.7			4.5		
QSRatio											
90th Percentile Output:											
fB%				1.7	1.7	1.7			1.7		
BOQ				9.6	6.9	8.5			5.0		
QSRatio											
95th Percentile Output:											
fB%				1.9	2.0	2.0			2.0		
BOQ				10.9	7.9	9.7			5.8		
QSRatio											
98th Percentile Output:											
fB%				2.3	2.4	2.4			2.5		
BOQ				13.3	9.7	11.8			7.2		
QSRatio											

ERROR MESSAGES

No errors to report.

Appendix I-3 **2015 Cumulative Baseline No Project HCS Intersection Worksheets**

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Volume	769		450					1161	240		2020	380
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	15.1	0.0				11.5	17.4	0.0
Yellow	3.6					3.6	4.3	
All Red	1.5					1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1213	4820	0.67	0.25	21.6	C		
							22.0	C
R	705	2803	0.67	0.25	22.7	C		
Westbound								
Northbound								
T	2875	5074	0.43	0.57	7.5	A	6.2	A
R	1583	1583	0.16	1.00	0.0+	A		
Southbound								
T	2875	5074	0.74	0.57	10.7	B	9.1	A
R	1583	1583	0.25	1.00	0.1	A		

Intersection Delay = 11.4 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Culver at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	769		450					1161	240		2020	380
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	202		118					306	63		532	100
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	809		474					1222	253		2126	400
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	15.1	0.0			11.5	17.4	0.0	
Yellow	3.6				3.6	4.3		
All Red	1.5				1.5	1.5		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	769		450					1161	240		2020	380
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	809		474					1222	253		2126	400
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
Lane group	L		R					T	R		T	R
Adj flow	809		474					1222	253		2126	400
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound	
LG	L		R				T	R		T	R
So	1900		1900				1900	1900		1900	1900
Lanes	3	0	2	0	0	0	3	1	0	3	1
fW	1.000		1.000				1.000	1.000		1.000	1.000
fHV	0.980		0.980				0.980	0.980		0.980	0.980
fG	1.000		1.000				1.000	1.000		1.000	1.000
fP	1.000		1.000				1.000	1.000		1.000	1.000
fBB	1.000		1.000				1.000	1.000		1.000	1.000
fA	1.000		1.000				1.000	1.000		1.000	1.000
fLU	0.908		0.885				0.908	1.000		0.908	1.000
fRT			0.850				1.000	0.850		1.000	0.850
fLT	0.950						1.000			1.000	
Sec.											
fLpb	1.000						1.000			1.000	
fRpb			1.000				1.000	1.000		1.000	1.000
S	4820		2803				5074	1583		5074	1583
Sec.											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	809	4820		0.17	0.25	1213	0.67
Prot								
Perm								
Thru								
Right	R	474	2803	#	0.17	0.25	705	0.67
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1222	5074		0.24	0.57	2875	0.43
Right	R	253	1583		0.16	1.00	1583	0.16
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2126	5074	#	0.42	0.57	2875	0.74
Right	R	400	1583		0.25	1.00	1583	0.25

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.59
Total lost time per cycle, L = 10.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.72

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.67	0.25	20.2	1.000	1213	0.24	1.4	0.0	21.6	C		
											22.0	C
R	0.67	0.25	20.2	1.000	705	0.24	2.5	0.0	22.7	C		
Westbound												
Northbound												
T	0.43	0.57	7.4	1.000	2875	0.11	0.1	0.0	7.5	A	6.2	A
R	0.16	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Southbound												

T	0.74	0.57	9.7	1.000	2875	0.30	1.0	0.0	10.7	B	9.1	A
R	0.25	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 11.4 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	22.4	20.2	0.00	0.0	0.0	21.6

	0.0						0.0	
R	0.0	0.00	22.4	20.2	0.00	0.0	0.0	22.7
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	13.0	7.4	0.00	0.0	0.0	7.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Southbound								
	0.0						0.0	
T	0.0	0.00	13.0	9.7	0.00	0.0	0.0	10.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 11.4 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	296	267			448	253	780	400
So	1900	1900			1900	1900	1900	1900
No.Lanes	3 0 2		0 0 0		0 3	1	0 3	1
SL	1769	1584			1862	1583	1862	1583
LnCapacity	445	398			1055	1583	1055	1583
Flow Ratio	0.2	0.2			0.2	0.2	0.4	0.3
v/c Ratio	0.67	0.67			0.42	0.16	0.74	0.25
Grn Ratio	0.25	0.25			0.57	1.00	0.57	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	4.4	4.0			4.3		9.7	
kB	0.3	0.3			0.6	0.7	0.6	0.7
Q2	0.6	0.6			0.4	0.1	1.5	0.2
Q Average	5.1	4.6			4.7		11.2	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	6.0	5.5			5.6		13.2	
QSRatio								
85th Percentile Output:								
fB%	1.6	1.6			1.6		1.5	
BOQ	7.9	7.2			7.3		16.9	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.7			1.7		1.6	
BOQ	8.7	7.9			8.0		18.3	
QSRatio								
95th Percentile Output:								
fB%	2.0	2.0			2.0		1.8	
BOQ	9.9	9.1			9.2		20.4	
QSRatio								
98th Percentile Output:								
fB%	2.4	2.4			2.4		2.1	
BOQ	12.1	11.1			11.2		23.8	
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Volume	1153		891					1847	300		1389	260
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	21.7	0.0				13.9	8.4	0.0
Yellow	3.6					3.6	4.3	
All Red	1.5					1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1743	4820	0.70	0.36	17.6	B		
							23.9	C
R	1014	2803	0.93	0.36	32.1	C		
Westbound								
Northbound								
T	2317	5074	0.84	0.46	17.3	B	14.9	B
R	1583	1583	0.20	1.00	0.1	A		
Southbound								
T	2317	5074	0.63	0.46	13.0	B	11.0	B
R	1583	1583	0.17	1.00	0.1	A		

Intersection Delay = 16.9 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: PM
Intersection: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2015
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	1153		891					1847	300		1389	260
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	303		234					486	79		366	68
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	1214		938					1944	316		1462	274
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	21.7	0.0			13.9	8.4	0.0	
Yellow	3.6				3.6	4.3		
All Red	1.5				1.5	1.5		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	1153		891					1847	300		1389	260
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	1214		938					1944	316		1462	274
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
Lane group	L		R					T	R		T	R
Adj flow	1214		938					1944	316		1462	274
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound	
LG	L		R				T	R		T	R
So	1900		1900				1900	1900		1900	1900
Lanes	3	0	2	0	0	0	3	1	0	3	1
fW	1.000		1.000				1.000	1.000		1.000	1.000
fHV	0.980		0.980				0.980	0.980		0.980	0.980
fG	1.000		1.000				1.000	1.000		1.000	1.000
fP	1.000		1.000				1.000	1.000		1.000	1.000
fBB	1.000		1.000				1.000	1.000		1.000	1.000
fA	1.000		1.000				1.000	1.000		1.000	1.000
fLU	0.908		0.885				0.908	1.000		0.908	1.000
fRT			0.850				1.000	0.850		1.000	0.850
fLT	0.950						1.000			1.000	
Sec.											
fLpb	1.000						1.000			1.000	
fRpb			1.000				1.000	1.000		1.000	1.000
S	4820		2803				5074	1583		5074	1583
Sec.											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	1214	4820		0.25	0.36	1743	0.70
Prot								
Perm								
Thru								
Right	R	938	2803	#	0.33	0.36	1014	0.93
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1944	5074	#	0.38	0.46	2317	0.84
Right	R	316	1583		0.20	1.00	1583	0.20
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1462	5074		0.29	0.46	2317	0.63
Right	R	274	1583		0.17	1.00	1583	0.17

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.72
Total lost time per cycle, L = 10.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.88

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.70	0.36	16.3	1.000	1743	0.26	1.2	0.0	17.6	B		
											23.9	C
R	0.93	0.36	18.4	1.000	1014	0.44	13.7	0.0	32.1	C		
Westbound												
Northbound												
T	0.84	0.46	14.4	1.000	2317	0.37	2.9	0.0	17.3	B	14.9	B
R	0.20	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.63	0.46	12.4	1.000	2317	0.21	0.6	0.0	13.0	B	11.0	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 16.9 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	19.1	16.3	0.00	0.0	0.0	17.6

	0.0						0.0	
R	0.0	0.00	19.1	18.4	0.00	0.0	0.0	32.1
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	16.3	14.4	0.00	0.0	0.0	17.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	16.3	12.4	0.00	0.0	0.0	13.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 16.9 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	445	529			713	316	536	274
So	1900	1900			1900	1900	1900	1900
No.Lanes	3 0	2	0 0	0	3	1	3	1
SL	1769	1584			1862	1583	1862	1583
LnCapacity	639	572			850	1583	850	1583
Flow Ratio	0.3	0.3			0.4	0.2	0.3	0.2
v/c Ratio	0.70	0.92			0.84	0.20	0.63	0.17
Grn Ratio	0.36	0.36			0.46	1.00	0.46	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	6.3	8.5			10.5		6.8	
kB	0.4	0.4			0.5	0.7	0.5	0.7
Q2	0.9	3.0			2.3	0.2	0.8	0.1
Q Average	7.2	11.5			12.7		7.6	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	8.6	13.5			14.9		9.0	
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5			1.5		1.5	
BOQ	11.1	17.3			19.0		11.7	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.6			1.6		1.7	
BOQ	12.2	18.7			20.5		12.8	
QSRatio								
95th Percentile Output:								
fB%	1.9	1.8			1.8		1.9	
BOQ	13.8	20.9			22.8		14.5	
QSRatio								
98th Percentile Output:								
fB%	2.3	2.1			2.1		2.3	
BOQ	16.5	24.3			26.4		17.2	
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 NB Ramps

Inter.: Jamboree at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Volume				1013	0	486		1206	683		1792	479	
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol						0			0			0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	48.7	0.0			5.9	15.2	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 85.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1014	1770	1.05	0.57	60.9	E		
LTR	1067	1863	0.00	0.57	7.8	A	45.1	D
R	907	1583	0.56	0.57	12.3	B		
Northbound								
T	2101	6765	0.60	0.31	25.4	C	16.3	B
R	1583	1583	0.45	1.00	0.2	A		
Southbound								
T	2101	6765	0.90	0.31	33.6	C	26.6	C
R	1583	1583	0.32	1.00	0.1	A		

Intersection Delay = 28.0 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Jamboree at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1013	0	486		1206	683		1792	479
% Heavy Veh				2	2	2		2	2		2	2
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
PK 15 Vol				267	0	128		317	180		472	126
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0		12.0	12.0
RTOR Vol						0				0			0
Adj Flow				1066	0	512			1269	719		1886	504
%InSharedLn				0		0							
Prop LTs					0.000				0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000	
Peds Bikes	0				0			0			0		
Buses				0	0	0		0	0		0	0	
%InProtPhase													

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0		0.0	0.0
Arriv. Type				3	3	3		3	3		3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		48.7	0.0			5.9	15.2	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 85.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1013	0	486		1206	683		1792	479
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
Adj flow				1066	0	512		1269	719		1886	504
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
Lane group				L		LTR	R		T	R		T	R
Adj flow				1066	0	512			1269	719		1886	504
Prop LTs					0.000				0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L	LTR	R		T	R		T	R	
So			1900	1900	1900		1900	1900		1900	1900	
Lanes	0	0	1	1	1	0	4	1	0	4	1	
fW			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fHV			0.980	0.980	0.980		0.980	0.980		0.980	0.980	
fG			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fP			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fBB			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fA			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fLU			1.000	1.000	1.000		0.908	1.000		0.908	1.000	
fRT				1.000	0.850		1.000	0.850		1.000	0.850	
fLT			0.950	1.000			1.000			1.000		
Sec.												
fLpb			1.000	1.000			1.000			1.000		
fRpb				1.000	1.000		1.000	1.000		1.000	1.000	
S			1770	1863	1583		6765	1583		6765	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	1066	1770	#	0.60	0.57	1014	1.05
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.57	1067	0.00
Right	R	512	1583		0.32	0.57	907	0.56
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1269	6765		0.19	0.31	2101	0.60
Right	R	719	1583		0.45	1.00	1583	0.45
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1886	6765	#	0.28	0.31	2101	0.90
Right	R	504	1583		0.32	1.00	1583	0.32

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.88
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.00

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.05	0.57	18.1	1.000	1014	0.50	42.7	0.0	60.9	E		
LTR	0.00	0.57	7.8	1.000	1067	0.11	0.0	0.0	7.8	A	45.1	D
R	0.56	0.57	11.5	1.000	907	0.16	0.8	0.0	12.3	B		
Northbound												
T	0.60	0.31	24.9	1.000	2101	0.19	0.5	0.0	25.4	C	16.3	B
R	0.45	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.90	0.31	28.0	1.000	2101	0.42	5.6	0.0	33.6	C	26.6	C
R	0.32	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 28.0 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	85.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	85.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	85.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	18.1	18.1	0.00	13.0	0.0	60.9
LTR	0.0	0.00	18.1	7.8	0.00	0.0	0.0	7.8
R	0.0	0.00	18.1	11.5	0.00	0.0	0.0	12.3
Northbound								
	0.0						0.0	
T	0.0	0.00	29.3	24.9	0.00	0.0	0.0	25.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	29.3	28.0	0.00	0.0	0.0	33.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 28.0 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup				L	LTR	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				1066	0	512	349	719	519	504
So				1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	1	1	1	0 4	1	0 4	1
SL				1770	1863	1583	1862	1583	1862	1583
LnCapacity				1014	1067	907	578	1583	578	1583
Flow Ratio				0.6	0.0	0.3	0.2	0.5	0.3	0.3
v/c Ratio				1.05	0.00	0.56	0.60	0.45	0.90	0.32
Grn Ratio				0.57	0.57	0.57	0.31	1.00	0.31	1.00
I Factor					1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00	1.00		1.00	
Q1				25.2	0.0	7.6	7.0		11.7	
kB				0.7	0.7	0.6	0.5	0.9	0.5	0.9
Q2				13.3	0.0	0.8	0.7	0.7	3.0	0.4
Q Average				38.4	0.0	8.4	7.7		14.7	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%				1.1	1.2	1.2	1.2		1.2	
BOQ				43.7	0.0	10.0	9.1		17.2	
QSRatio										
85th Percentile Output:										
fB%				1.4	1.6	1.5	1.5		1.5	
BOQ				53.2	0.0	12.9	11.8		21.8	
QSRatio										
90th Percentile Output:										
fB%				1.5	1.8	1.7	1.7		1.6	
BOQ				56.0	0.0	14.0	12.9		23.4	
QSRatio										
95th Percentile Output:										
fB%				1.6	2.1	1.9	1.9		1.8	
BOQ				60.4	0.0	15.8	14.6		26.0	
QSRatio										
98th Percentile Output:										
fB%				1.8	2.7	2.2	2.3		2.0	
BOQ				67.3	0.0	18.7	17.4		29.8	
QSRatio										

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 NB Ramps

Inter.: Jamboree at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Volume				359	0	965		2585	690		1521	480
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		P			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		45.1	0.0			22.2	12.6	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 95.1 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	839	1770	0.45	0.47	17.1	B		
LTR	884	1863	0.00	0.47	13.1	B	144.9	F
R	751	1583	1.35	0.47	192.5	F		
Northbound								
T	2853	6765	0.95	0.42	35.2	D	27.8	C
R	1583	1583	0.46	1.00	0.2	A		
Southbound								
T	2853	6765	0.56	0.42	21.1	C	16.1	B
R	1583	1583	0.32	1.00	0.1	A		

Intersection Delay = 47.7 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Jamboree at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				359	0	965		2585	690		1521	480
% Heavy Veh				2	2	2		2	2		2	2
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
PK 15 Vol				94	0	254		680	182		400	126
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0		12.0	12.0
RTOR Vol						0				0			0
Adj Flow				378	0	1016			2721	726		1601	505
%InSharedLn				0		0							
Prop LTs					0.000				0.000			0.000	
Prop RTs					0.000	1.000			0.000	1.000		0.000	1.000
Peds Bikes	0				0				0			0	
Buses				0	0	0			0	0		0	0
%InProtPhase													

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0			0.0	0.0		0.0	0.0
Arriv. Type				3	3	3			3	3		3	3
Unit Ext.				3.0	3.0	3.0			3.0	3.0		3.0	3.0
I Factor					1.000				1.000			1.000	
Lost Time				2.0	2.0	2.0			2.0	2.0		2.0	2.0
Ext of g				2.0	2.0	2.0			2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2				3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		P			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		45.1	0.0			22.2	12.6	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 95.1 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				359	0	965		2585	690		1521	480
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
Adj flow				378	0	1016		2721	726		1601	505
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
Lane group				L		LTR	R		T	R		T	R
Adj flow				378	0	1016		2721	726		1601	505	
Prop LTs					0.000			0.000			0.000		
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	LTR	R		T	R		T	R
So				1900	1900	1900		1900	1900		1900	1900
Lanes	0	0	0	1	1	1	0	4	1	0	4	1
fW				1.000	1.000	1.000		1.000	1.000		1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980		0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000		1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000		1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000		1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000		1.000	1.000
fLU				1.000	1.000	1.000		0.908	1.000		0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000			1.000	
Sec.												
fLpb				1.000	1.000			1.000			1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				1770	1863	1583		6765	1583		6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	378	1770		0.21	0.47	839	0.45
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.47	884	0.00
Right	R	1016	1583	#	0.64	0.47	751	1.35
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2721	6765	#	0.40	0.42	2853	0.95
Right	R	726	1583		0.46	1.00	1583	0.46
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1601	6765		0.24	0.42	2853	0.56
Right	R	505	1583		0.32	1.00	1583	0.32

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.04
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.17

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
Westbound												
L	0.45	0.47	16.7	1.000	839	0.11	0.4	0.0	17.1	B		
LTR	0.00	0.47	13.1	1.000	884	0.50	0.0	0.0	13.1	B	144.9	F
R	1.35	0.47	25.0	1.000	751	0.50	167.5	0.0	192.5	F		
Northbound												
T	0.95	0.42	26.6	1.000	2853	0.46	8.6	0.0	35.2	D	27.8	C
R	0.46	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.56	0.42	20.8	1.000	2853	0.16	0.3	0.0	21.1	C	16.1	B
R	0.32	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 47.7 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.1 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.1 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.1 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	25.0	16.7	0.00	0.0	0.0	17.1
LTR	0.0	0.00	25.0	13.1	0.00	0.0	0.0	13.1
R	0.0	0.00	25.0	25.0	0.00	66.3	0.0	192.5
Northbound								
	0.0						0.0	
T	0.0	0.00	27.5	26.6	0.00	0.0	0.0	35.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	27.5	20.8	0.00	0.0	0.0	21.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 47.7 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup				L	LTR	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				378	0	1016	749	726	440	505
So				1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	1	1	1	0 4	1	0 4	1
SL				1770	1863	1583	1862	1583	1862	1583
LnCapacity				839	884	751	785	1583	785	1583
Flow Ratio				0.2	0.0	0.6	0.4	0.5	0.2	0.3
v/c Ratio				0.45	0.00	1.35	0.95	0.46	0.56	0.32
Grn Ratio				0.47	0.47	0.47	0.42	1.00	0.42	1.00
I Factor					1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00	1.00		1.00	
Q1				6.7	0.0	26.8	19.1		8.8	
kB				0.6	1.1	0.6	0.6	0.9	0.6	0.9
Q2				0.5	0.0	35.3	5.7	0.8	0.8	0.4
Q Average				7.2	0.0	62.1	24.8		9.6	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%				1.2	1.3	1.1	1.2		1.2	
BOQ				8.5	0.0	69.7	28.6		11.3	
QSRatio										
85th Percentile Output:										
fB%				1.5	1.7	1.3	1.4		1.5	
BOQ				11.1	0.0	83.1	35.5		14.5	
QSRatio										
90th Percentile Output:										
fB%				1.7	2.0	1.4	1.5		1.6	
BOQ				12.1	0.0	88.1	37.6		15.8	
QSRatio										
95th Percentile Output:										
fB%				1.9	2.6	1.5	1.7		1.9	
BOQ				13.7	0.0	94.4	41.0		17.7	
QSRatio										
98th Percentile Output:										
fB%				2.3	3.2	1.7	1.8		2.2	
BOQ				16.4	0.0	106	45.9		20.9	
QSRatio										

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Volume	463		988					1417	420		2062	550
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	24.8	0.0			7.6	12.4	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1421	3437	0.34	0.41	12.2	B		
							21.5	C
R	1159	2803	0.90	0.41	25.9	C		
Westbound								
Northbound								
T	2853	6765	0.52	0.42	13.0	B	10.1	B
R	1583	1583	0.28	1.00	0.1	A		
Southbound								
T	2853	6765	0.76	0.42	16.0	B	12.7	B
R	1583	1583	0.37	1.00	0.1	A		

Intersection Delay = 14.0 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Jamboree at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	463		988					1417	420		2062	550
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	122		260					373	111		543	145
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	487		1040					1492	442		2171	579
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	24.8	0.0			7.6	12.4	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	463		988					1417	420		2062	550
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	487		1040					1492	442		2171	579
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
Lane group	L		R					T	R		T	R
Adj flow	487		1040					1492	442		2171	579
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound					Westbound					Northbound			Southbound	
LG	L		R								T	R		T	R
So	1900		1900								1900	1900		1900	1900
Lanes	2	0	2	0	0	0	0				4	1	0	4	1
fW	1.000		1.000								1.000	1.000		1.000	1.000
fHV	0.980		0.980								0.980	0.980		0.980	0.980
fG	1.000		1.000								1.000	1.000		1.000	1.000
fP	1.000		1.000								1.000	1.000		1.000	1.000
fBB	1.000		1.000								1.000	1.000		1.000	1.000
fA	1.000		1.000								1.000	1.000		1.000	1.000
fLU	0.971		0.885								0.908	1.000		0.908	1.000
fRT			0.850								1.000	0.850		1.000	0.850
fLT	0.950										1.000			1.000	
Sec.															
fLpb	1.000										1.000			1.000	
fRpb			1.000								1.000	1.000		1.000	1.000
S	3437		2803								6765	1583		6765	1583
Sec.															

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	487	3437		0.14	0.41	1421	0.34
Prot								
Perm								
Thru								
Right	R	1040	2803	#	0.37	0.41	1159	0.90
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1492	6765		0.22	0.42	2853	0.52
Right	R	442	1583		0.28	1.00	1583	0.28
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2171	6765	#	0.32	0.42	2853	0.76
Right	R	579	1583		0.37	1.00	1583	0.37

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.69
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.83

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.34	0.41	12.0	1.000	1421	0.11	0.1	0.0	12.2	B		
											21.5	C
R	0.90	0.41	16.4	1.000	1159	0.42	9.5	0.0	25.9	C		
Westbound												
Northbound												
T	0.52	0.42	12.9	1.000	2853	0.13	0.2	0.0	13.0	B	10.1	B
R	0.28	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.76	0.42	14.8	1.000	2853	0.31	1.2	0.0	16.0	B	12.7	B
R	0.37	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 14.0 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	17.6	12.0	0.00	0.0	0.0	12.2

	0.0						0.0	
R	0.0	0.00	17.6	16.4	0.00	0.0	0.0	25.9
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	17.3	12.9	0.00	0.0	0.0	13.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	17.3	14.8	0.00	0.0	0.0	16.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 14.0 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	250	587			410	442	597	579
So	1900	1900			1900	1900	1900	1900
No.Lanes	2 0 2		0 0 0		0 4	1	0 4	1
SL	1770	1584			1862	1583	1862	1583
LnCapacity	731	654			785	1583	785	1583
Flow Ratio	0.1	0.4			0.2	0.3	0.3	0.4
v/c Ratio	0.34	0.90			0.52	0.28	0.76	0.37
Grn Ratio	0.41	0.41			0.42	1.00	0.42	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	2.8	9.1			5.1		8.5	
kB	0.4	0.4			0.5	0.7	0.5	0.7
Q2	0.2	2.8			0.5	0.3	1.4	0.4
Q Average	3.1	11.9			5.6		9.9	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	3.7	14.0			6.6		11.6	
QSRatio								
85th Percentile Output:								
fB%	1.6	1.5			1.5		1.5	
BOQ	4.8	17.9			8.6		15.0	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.6			1.7		1.6	
BOQ	5.4	19.3			9.5		16.2	
QSRatio								
95th Percentile Output:								
fB%	2.0	1.8			1.9		1.8	
BOQ	6.2	21.5			10.8		18.2	
QSRatio								
98th Percentile Output:								
fB%	2.5	2.1			2.4		2.2	
BOQ	7.7	25.0			13.1		21.4	
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Volume	725		756					2495	1110		1454	430
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	20.0	0.0				9.8	15.0	0.0
Yellow	3.6					4.3	4.3	
All Red	1.0					1.0	1.0	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1146	3437	0.67	0.33	18.6	B		
							22.5	C
R	934	2803	0.85	0.33	26.3	C		
Westbound								
Northbound								
T	3394	6765	0.77	0.50	13.3	B	9.8	A
R	1583	1583	0.74	1.00	1.9	A		
Southbound								
T	3394	6765	0.45	0.50	9.7	A	7.5	A
R	1583	1583	0.29	1.00	0.1	A		

Intersection Delay = 11.9 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: PM
Intersection: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2015
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	725		756					2495	1110		1454	430
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	191		199					657	292		383	113
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	763		796					2626	1168		1531	453
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	20.0	0.0			9.8	15.0	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	725		756					2495	1110		1454	430
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	763		796					2626	1168		1531	453
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
Lane group	L		R					T	R		T	R
Adj flow	763		796					2626	1168		1531	453
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound					Westbound					Northbound			Southbound	
LG	L		R								T	R		T	R
So	1900		1900								1900	1900		1900	1900
Lanes	2	0	2	0	0	0	0				4	1	0	4	1
fW	1.000		1.000								1.000	1.000		1.000	1.000
fHV	0.980		0.980								0.980	0.980		0.980	0.980
fG	1.000		1.000								1.000	1.000		1.000	1.000
fP	1.000		1.000								1.000	1.000		1.000	1.000
fBB	1.000		1.000								1.000	1.000		1.000	1.000
fA	1.000		1.000								1.000	1.000		1.000	1.000
fLU	0.971		0.885								0.908	1.000		0.908	1.000
fRT			0.850								1.000	0.850		1.000	0.850
fLT	0.950										1.000			1.000	
Sec.															
fLpb	1.000										1.000			1.000	
fRpb			1.000								1.000	1.000		1.000	1.000
S	3437		2803								6765	1583		6765	1583
Sec.															

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left	L	763	3437	0.22	0.33	1146	0.67
Prot							
Perm							
Thru							
Right	R	796	2803	0.28	0.33	934	0.85
Westbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	2626	6765	0.39	0.50	3394	0.77
Right	R	1168	1583	# 0.74	1.00	1583	0.74
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1531	6765	0.23	0.50	3394	0.45
Right	R	453	1583	0.29	1.00	1583	0.29

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.74
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.74

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.67	0.33	17.1	1.000	1146	0.24	1.5	0.0	18.6	B		
											22.5	C
R	0.85	0.33	18.6	1.000	934	0.38	7.7	0.0	26.3	C		
Westbound												
Northbound												
T	0.77	0.50	12.2	1.000	3394	0.32	1.2	0.0	13.3	B	9.8	A
R	0.74	1.00	0.0	0.950	1583	0.30	1.9	0.0	1.9	A		
Southbound												

T	0.45	0.50	9.6	1.000	3394	0.11	0.1	0.0	9.7	A	7.5	A
R	0.29	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 11.9 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	20.0	17.1	0.00	0.0	0.0	18.6

	0.0						0.0	
R	0.0	0.00	20.0	18.6	0.00	0.0	0.0	26.3
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	14.9	12.2	0.00	0.0	0.0	13.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.9
Southbound								
	0.0						0.0	
T	0.0	0.00	14.9	9.6	0.00	0.0	0.0	9.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 11.9 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	392	449			723	1168	421	453
So	1900	1900			1900	1900	1900	1900
No.Lanes	2 0 2		0 0 0		0 4	1	0 4	1
SL	1770	1584			1862	1583	1862	1583
LnCapacity	590	527			934	1583	934	1583
Flow Ratio	0.2	0.3			0.4	0.7	0.2	0.3
v/c Ratio	0.66	0.85			0.77	0.74	0.45	0.29
Grn Ratio	0.33	0.33			0.50	1.00	0.50	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	5.6	7.0			9.8		4.5	
kB	0.4	0.4			0.5	0.7	0.5	0.7
Q2	0.8	1.8			1.7	1.9	0.4	0.3
Q Average	6.4	8.8			11.5		4.9	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	7.5	10.3			13.5		5.9	
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5			1.5		1.6	
BOQ	9.8	13.4			17.3		7.7	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.7			1.6		1.7	
BOQ	10.7	14.5			18.7		8.5	
QSRatio								
95th Percentile Output:								
fB%	1.9	1.9			1.8		2.0	
BOQ	12.2	16.4			20.9		9.7	
QSRatio								
98th Percentile Output:								
fB%	2.3	2.2			2.1		2.4	
BOQ	14.7	19.4			24.3		11.8	
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 NB Ramps

Inter.: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	151	0	300				314	1029			2650	56
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right	A				WB Right			
Green	20.4	0.0				10.7	26.7	31.3	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 110.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	328	1770	0.48	0.19	41.2	D		
LTR	346	1863	0.00	0.19	36.5	D	92.7	F
R	294	1583	1.07	0.19	118.6	F		
Westbound								
Northbound								
L	334	3437	0.99	0.10	96.3	F		
T	3630	5074	0.30	0.72	5.7	A	26.9	C
Southbound								
T	2943	5074	0.95	0.58	29.2	C	28.6	C
R	1583	1583	0.04	1.00	0.0+	A		

Intersection Delay = 34.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Tustin Ranch at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 NB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	151	0	300				314	1029			2650	56
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	40	0	79				83	271			697	15
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	159	0	316				331	1083			2789	59
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru	A	A	A
Right		A			Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right		A			WB Right			
Green		20.4	0.0			10.7	26.7	31.3 0.0
Yellow		3.6				3.2	4.3	4.3
All Red		1.5				1.0	1.5	1.5

Cycle Length: 110.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	151	0	300				314	1029			2650	56
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	159	0	316				331	1083			2789	59
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	159	0	316				331	1083			2789	59
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	159	1770		0.09	0.19	328	0.48
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.19	346	0.00
Right	R	316	1583	#	0.20	0.19	294	1.07
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	331	3437	#	0.10	0.10	334	0.99
Prot								
Perm								
Thru	T	1083	5074		0.21	0.72	3630	0.30
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2789	5074	#	0.55	0.58	2943	0.95
Right	R	59	1583		0.04	1.00	1583	0.04

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.85
Total lost time per cycle, L = 15.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.98

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.48	0.19	40.1	1.000	328	0.11	1.1	0.0	41.2	D		
LTR	0.00	0.19	36.5	1.000	346	0.11	0.0	0.0	36.5	D	92.7	F
R	1.07	0.19	44.8	1.000	294	0.50	73.8	0.0	118.6	F		
Westbound												
Northbound												
L	0.99	0.10	49.6	1.000	334	0.49	46.7	0.0	96.3	F		
T	0.30	0.72	5.7	1.000	3630	0.11	0.0	0.0	5.7	A	26.9	C
Southbound												

T	0.95	0.58	21.5	1.000	2943	0.46	7.7	0.0	29.2	C	28.6	C
R	0.04	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		

Intersection delay = 34.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	110.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	110.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	110.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	44.8	40.1	0.00	0.0	0.0	41.2

LTR	0.0	0.00	44.8	36.5	0.00	0.0	0.0	36.5
R	0.0	0.00	44.8	44.8	0.00	5.5	0.0	118.6
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	49.7	49.6	0.00	0.0	0.0	96.3
T	0.0	0.00	15.7	5.7	0.00	0.0	0.0	5.7
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	23.1	21.5	0.00	0.0	0.0	29.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+

Intersection Delay 34.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	159	0	316				170	397		1023	59	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	328	346	294				171	1332		1080	1583	
Flow Ratio	0.1	0.0	0.2				0.1	0.2		0.5	0.0	
v/c Ratio	0.48	0.00	1.07				0.99	0.30		0.95	0.04	
Grn Ratio	0.19	0.19	0.19				0.10	0.72		0.58	1.00	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00		
Q1	4.3	0.0	9.7				5.2	4.4		29.1		
kB	0.4	0.4	0.4				0.3	0.9		0.8	1.0	
Q2	0.4	0.0	5.5				2.3	0.4		7.2	0.0	
Q Average	4.7	0.0	15.1				7.5	4.8		36.4		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.1		
BOQ	5.6	0.0	17.7				8.9	5.7		41.5		
QSRatio												
85th Percentile Output:												
fB%	1.6	1.6	1.5				1.5	1.6		1.4		
BOQ	7.3	0.0	22.4				11.5	7.4		50.5		
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8	1.6				1.7	1.7		1.5		
BOQ	8.1	0.0	24.0				12.6	8.2		53.3		
QSRatio												
95th Percentile Output:												
fB%	2.0	2.1	1.8				1.9	2.0		1.6		
BOQ	9.3	0.0	26.6				14.3	9.4		57.5		
QSRatio												
98th Percentile Output:												
fB%	2.4	2.7	2.0				2.3	2.4		1.8		
BOQ	11.3	0.0	30.4				17.0	11.4		64.1		
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 NB Ramps

Inter.: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	333	0	234				626	1897			1066	494
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right	A				WB Right				
Green	13.6	0.0				14.7	5.4	5.4	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	401	1770	0.88	0.23	41.4	D		
LTR	422	1863	0.00	0.23	17.9	B	35.3	D
R	359	1583	0.69	0.23	26.6	C		
Westbound								
Northbound								
L	842	3437	0.78	0.24	26.0	C		
T	3002	5074	0.67	0.59	8.8	A	13.1	B
Southbound								
T	1404	5074	0.80	0.28	23.5	C	16.1	B
R	1583	1583	0.33	1.00	0.1	A		

Intersection Delay = 16.8 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Tustin Ranch at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 NB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	333	0	234				626	1897			1066	494
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	88	0	62				165	499			281	130
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	351	0	246				659	1997			1122	520
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right	A				WB Right			
Green	13.6	0.0				14.7	5.4	5.4	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	333	0	234				626	1897			1066	494
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	351	0	246				659	1997			1122	520
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	351	0	246				659	1997			1122	520
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	351	1770	#	0.20	0.23	401	0.88
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.23	422	0.00
Right	R	246	1583		0.16	0.23	359	0.69
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	659	3437	#	0.19	0.24	842	0.78
Prot								
Perm								
Thru	T	1997	5074		0.39	0.59	3002	0.67
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1122	5074	#	0.22	0.28	1404	0.80
Right	R	520	1583		0.33	1.00	1583	0.33

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.61
Total lost time per cycle, L = 15.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.82

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.88	0.23	22.4	1.000	401	0.40	19.0	0.0	41.4	D		
LTR	0.00	0.23	17.9	1.000	422	0.11	0.0	0.0	17.9	B	35.3	D
R	0.69	0.23	21.2	1.000	359	0.25	5.4	0.0	26.6	C		
Westbound												
Northbound												
L	0.78	0.24	21.2	1.000	842	0.33	4.8	0.0	26.0	C		
T	0.67	0.59	8.2	1.000	3002	0.24	0.6	0.0	8.8	A	13.1	B
Southbound												

T	0.80	0.28	20.2	1.000	1404	0.34	3.4	0.0	23.5	C	16.1	B
R	0.33	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 16.8 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	23.2	22.4	0.00	0.0	0.0	41.4

LTR	0.0	0.00	23.2	17.9	0.00	0.0	0.0	17.9
R	0.0	0.00	23.2	21.2	0.00	0.0	0.0	26.6
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	22.7	21.2	0.00	0.0	0.0	26.0
T	0.0	0.00	12.3	8.2	0.00	0.0	0.0	8.8
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	21.7	20.2	0.00	0.0	0.0	23.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 16.8 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	351	0	246				339	733		411	520	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	0	3	1
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	401	422	359				433	1102		515	1583	
Flow Ratio	0.2	0.0	0.2				0.2	0.4		0.2	0.3	
v/c Ratio	0.88	0.00	0.69				0.78	0.67		0.80	0.33	
Grn Ratio	0.23	0.23	0.23				0.24	0.59		0.28	1.00	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00		
Q1	5.6	0.0	3.8				5.3	8.2		6.4		
kB	0.3	0.3	0.3				0.3	0.6		0.4	0.7	
Q2	1.7	0.0	0.6				1.1	1.1		1.3	0.3	
Q Average	7.4	0.0	4.4				6.4	9.3		7.7		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.2		
BOQ	8.7	0.0	5.2				7.5	11.0		9.1		
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6	1.6				1.5	1.5		1.5		
BOQ	11.3	0.0	6.8				9.8	14.2		11.7		
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8	1.7				1.7	1.7		1.7		
BOQ	12.3	0.0	7.5				10.8	15.4		12.8		
QSRatio												
95th Percentile Output:												
fB%	1.9	2.1	2.0				1.9	1.9		1.9		
BOQ	14.0	0.0	8.6				12.2	17.3		14.5		
QSRatio												
98th Percentile Output:												
fB%	2.3	2.7	2.4				2.3	2.2		2.3		
BOQ	16.7	0.0	10.5				14.7	20.4		17.3		
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	746	0	883				160	1007			2413	551
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	51.3	0.0				5.3	33.9	22.0	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 129.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	699	1770	1.12	0.39	112.5	F		
LTR	736	1863	0.00	0.39	23.8	C	196.0	F
R	625	1583	1.49	0.39	266.7	F		
Westbound								
Northbound								
L	140	3437	1.20	0.04	202.0	F		
T	2723	5074	0.39	0.54	17.7	B	42.9	D
Southbound								
T	2371	5074	1.07	0.47	75.6	E	68.0	E
R	740	1583	0.78	0.47	34.6	C		

Intersection Delay = 99.1 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Tustin Ranch at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	746	0	883				160	1007			2413	551
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	196	0	232				42	265			635	145
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	785	0	929				168	1060			2540	580
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	51.3	0.0				5.3	33.9	22.0 0.0
Yellow	3.6					3.2	4.3	4.3
All Red	0.5					0.5	0.5	0.5

Cycle Length: 129.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	746	0	883				160	1007			2413	551
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	785	0	929				168	1060			2540	580
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	785	0	929				168	1060			2540	580
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound						Westbound						Northbound						Southbound					
LG	L		LTR	R									L		T				T		R			
So	1900		1900	1900									1900		1900				1900		1900			
Lanes	1		1		0		0		0				2		3		0		0		3		1	
fW	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fHV	0.980		0.980	0.980									0.980		0.980						0.980		0.980	
fG	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fP	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fBB	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fA	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fLU	1.000		1.000	1.000									0.971		0.908						0.908		1.000	
fRT			1.000	0.850											1.000						1.000		0.850	
fLT	0.950		1.000										0.950		1.000						1.000			
Sec.																								
fLpb	1.000		1.000										1.000		1.000						1.000			
fRpb			1.000	1.000											1.000						1.000		1.000	
S	1770		1863	1583									3437		5074						5074		1583	
Sec.																								

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	785	1770		0.44	0.39	699	1.12
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.39	736	0.00
Right	R	929	1583	#	0.59	0.39	625	1.49
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	168	3437	#	0.05	0.04	140	1.20
Prot								
Perm								
Thru	T	1060	5074		0.21	0.54	2723	0.39
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2540	5074	#	0.50	0.47	2371	1.07
Right	R	580	1583		0.37	0.47	740	0.78

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.14
Total lost time per cycle, L = 12.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.26

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.12	0.39	39.3	1.000	699	0.50	73.2	0.0	112.5	F		
LTR	0.00	0.39	23.8	1.000	736	0.11	0.0	0.0	23.8	C	196.0	F
R	1.49	0.39	39.3	1.000	625	0.50	227.4	0.0	266.7	F		
Westbound												
Northbound												
L	1.20	0.04	62.3	1.000	140	0.50	139.7	0.0	202.0	F		
T	0.39	0.54	17.6	1.000	2723	0.11	0.1	0.0	17.7	B	42.9	D
Southbound												

T	1.07	0.47	34.6	1.000	2371	0.50	41.0	0.0	75.6	E	68.0 E
R	0.78	0.47	29.1	1.000	740	0.33	5.5	0.0	34.6	C	

Intersection delay = 99.1 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 129.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 129.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	129.9 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	39.3	39.3	0.00	21.5	0.0	112.5

LTR	0.0	0.00	39.3	23.8	0.00	0.0	0.0	23.8
R	0.0	0.00	39.3	39.3	0.00	76.0	0.0	266.7
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	62.3	62.3	0.00	7.0	0.0	202.0
T	0.0	0.00	30.1	17.6	0.00	0.0	0.0	17.7
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	34.6	34.6	0.00	42.3	0.0	75.6
R	0.0	0.00	34.6	29.1	0.00	0.0	0.0	34.6

Intersection Delay 99.1 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	785	0	929				86	389		932	580	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	699	736	625				72	999		870	740	
Flow Ratio	0.4	0.0	0.6				0.0	0.2		0.5	0.4	
v/c Ratio	1.12	0.00	1.49				1.19	0.39		1.07	0.78	
Grn Ratio	0.39	0.39	0.39				0.04	0.54		0.47	0.47	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
Q1	28.3	0.0	33.5				3.1	8.2		33.6	17.6	
kB	0.7	0.7	0.6				0.2	0.9		0.8	0.7	
Q2	15.2	0.0	39.9				2.5	0.5		14.2	2.3	
Q Average	43.5	0.0	73.4				5.6	8.8		47.9	19.9	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.1				1.2	1.2		1.1	1.2	
BOQ	49.4	0.0	81.9				6.7	10.3		54.1	23.1	
QSRatio												
85th Percentile Output:												
fB%	1.4	1.6	1.3				1.5	1.5		1.4	1.5	
BOQ	59.7	0.0	97.3				8.7	13.4		65.1	29.0	
QSRatio												
90th Percentile Output:												
fB%	1.4	1.8	1.4				1.7	1.7		1.4	1.5	
BOQ	62.9	0.0	104				9.6	14.5		68.7	30.8	
QSRatio												
95th Percentile Output:												
fB%	1.6	2.1	1.5				1.9	1.9		1.5	1.7	
BOQ	67.6	0.0	111				10.9	16.4		73.8	33.8	
QSRatio												
98th Percentile Output:												
fB%	1.7	2.7	1.7				2.3	2.2		1.7	1.9	
BOQ	75.6	0.0	125				13.2	19.4		82.6	38.2	
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	667	0	412				169	1916			1013	302
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0								0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	24.9	0.0				5.3	11.9	5.2	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 64.7 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	681	1770	1.03	0.38	62.5	E		
LTR	717	1863	0.00	0.38	12.2	B	46.6	D
R	609	1583	0.71	0.38	20.8	C		
Westbound								
Northbound								
L	282	3437	0.63	0.08	33.3	C		
T	2423	5074	0.83	0.48	17.3	B	18.6	B
Southbound								
T	1717	5074	0.62	0.34	18.6	B	18.8	B
R	536	1583	0.59	0.34	19.5	B		

Intersection Delay = 25.4 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Tustin Ranch at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	667	0	412				169	1916			1013	302
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	176	0	108				44	504			267	79
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	702	0	434				178	2017			1066	318
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru	A	A	A
Right		A			Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		24.9	0.0			5.3	11.9	5.2	0.0
Yellow		3.6				3.2	4.3	4.3	
All Red		0.5				0.5	0.5	0.5	

Cycle Length: 64.7 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	667	0	412				169	1916			1013	302
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	702	0	434				178	2017			1066	318
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	702	0	434				178	2017			1066	318
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	702	1770	#	0.40	0.38	681	1.03
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.38	717	0.00
Right	R	434	1583		0.27	0.38	609	0.71
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	178	3437		0.05	0.08	282	0.63
Prot								
Perm								
Thru	T	2017	5074	#	0.40	0.48	2423	0.83
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1066	5074		0.21	0.34	1717	0.62
Right	R	318	1583		0.20	0.34	536	0.59

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.79
Total lost time per cycle, L = 8.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.92

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.03	0.38	19.9	1.000	681	0.50	42.6	0.0	62.5	E		
LTR	0.00	0.38	12.2	1.000	717	0.11	0.0	0.0	12.2	B	46.6	D
R	0.71	0.38	16.9	1.000	609	0.28	3.9	0.0	20.8	C		
Westbound												
Northbound												
L	0.63	0.08	28.8	1.000	282	0.21	4.5	0.0	33.3	C		
T	0.83	0.48	14.7	1.000	2423	0.37	2.6	0.0	17.3	B	18.6	B
Southbound												

T	0.62	0.34	17.9	1.000	1717	0.20	0.7	0.0	18.6	B	18.8	B
R	0.59	0.34	17.7	1.000	536	0.18	1.8	0.0	19.5	B		

Intersection delay = 25.4 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	64.7 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	64.7 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

			EBLT	WBLT	NBLT	SBLT
Cycle length, C	64.7	sec				
Adj. LT vol from Vol Adjustment Worksheet, v						
v/c ratio from Capacity Worksheet, X						
Protected phase effective green interval, g (s)						
Opposing queue effective green interval, gq						
Unopposed green interval, gu						
Red time r=(C-g-gq-gu)						
Arrival rate, qa=v/(3600(max[X,1.0]))						
Protected ph. departure rate, Sp=s/3600						
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)						
XPerm						
XProt						
Case						
Queue at beginning of green arrow, Qa						
Queue at beginning of unsaturated green, Qu						
Residual queue, Qr						
Uniform Delay, d1						

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

L	0.0	0.00	19.9	19.9	0.00	5.3	0.0	62.5
LTR	0.0	0.00	19.9	12.2	0.00	0.0	0.0	12.2
R	0.0	0.00	19.9	16.9	0.00	0.0	0.0	20.8
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	29.7	28.8	0.00	0.0	0.0	33.3
T	0.0	0.00	16.9	14.7	0.00	0.0	0.0	17.3
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	21.4	17.9	0.00	0.0	0.0	18.6
R	0.0	0.00	21.4	17.7	0.00	0.0	0.0	19.5

Intersection Delay 25.4 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	702	0	434				91	740		391	318	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	681	717	609				145	889		630	536	
Flow Ratio	0.4	0.0	0.3				0.1	0.4		0.2	0.2	
v/c Ratio	1.03	0.00	0.71				0.63	0.83		0.62	0.59	
Grn Ratio	0.38	0.38	0.38				0.08	0.48		0.34	0.34	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
Q1	12.6	0.0	6.6				1.6	11.5		5.9	4.7	
kB	0.4	0.5	0.4				0.2	0.5		0.4	0.4	
Q2	7.7	0.0	1.0				0.3	2.3		0.7	0.6	
Q Average	20.3	0.0	7.6				1.9	13.9		6.6	5.3	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.2	1.2	
BOQ	23.6	0.0	9.0				2.2	16.2		7.8	6.3	
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6	1.5				1.6	1.5		1.5	1.6	
BOQ	29.5	0.0	11.7				3.0	20.6		10.1	8.2	
QSRatio												
90th Percentile Output:												
fB%	1.5	1.8	1.7				1.8	1.6		1.7	1.7	
BOQ	31.4	0.0	12.7				3.3	22.2		11.1	9.0	
QSRatio												
95th Percentile Output:												
fB%	1.7	2.1	1.9				2.0	1.8		1.9	1.9	
BOQ	34.5	0.0	14.4				3.8	24.6		12.6	10.3	
QSRatio												
98th Percentile Output:												
fB%	1.9	2.7	2.3				2.6	2.0		2.3	2.4	
BOQ	38.8	0.0	17.2				4.8	28.3		15.1	12.5	
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 NB Ramps

Inter.: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
LGConfig				L		LT	R	L	T		T	R
Volume				347	2	247		439	873		1493	589
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	19.9	0.0				24.4	19.5	15.6	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	371	1770	0.98	0.21	79.7	E		
LT	390	1863	0.01	0.21	29.7	C	66.0	E
R	332	1583	0.78	0.21	47.1	D		
Northbound								
L	455	1770	1.02	0.26	81.4	F		
T	3595	5074	0.26	0.71	5.0	A	30.5	C
Southbound								
T	2094	5074	0.75	0.41	25.3	C	32.4	C
R	653	1583	0.95	0.41	50.4	D		

Intersection Delay = 36.8 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Redhill Ave at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 NB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				347	2	247	439	873			1493	589
% Heavy Veh				2	2	2	2	2			2	2
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
PK 15 Vol				91	1	65	116	230			393	155
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900	1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
LGConfig				L		LT	R	L		T			T	R
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0	
Adj Flow				365	2	260	462	919			1572	620
%InSharedLn				0								
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000
Peds Bikes	0				0						0	
Buses				0	0	0	0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Arriv. Type				3	3	3	3	3			3	3
Unit Ext.				3.0	3.0	3.0	3.0	3.0			3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ext of g				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	19.9	0.0				24.4	19.5	15.6	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				347	2	247	439	873			1493	589
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
Adj flow				365	2	260	462	919			1572	620
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
Lane group				L		LT	R	L		T			T	R
Adj flow				365	2	260	462	919			1572	620
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L	LT	R	L	T		T	R		
So			1900	1900	1900	1900	1900		1900	1900		
Lanes	0	0	1	1	1	1	3	0	3	1		
fW			1.000	1.000	1.000	1.000	1.000		1.000	1.000		
fHV			0.980	0.980	0.980	0.980	0.980		0.980	0.980		
fG			1.000	1.000	1.000	1.000	1.000		1.000	1.000		
fP			1.000	1.000	1.000	1.000	1.000		1.000	1.000		
fBB			1.000	1.000	1.000	1.000	1.000		1.000	1.000		
fA			1.000	1.000	1.000	1.000	1.000		1.000	1.000		
fLU			1.000	1.000	1.000	1.000	0.908		0.908	1.000		
fRT				1.000	0.850		1.000		1.000	0.850		
fLT			0.950	1.000		0.950	1.000		1.000			
Sec.												
fLpb			1.000	1.000		1.000	1.000		1.000			
fRpb				1.000	1.000		1.000		1.000	1.000		
S			1770	1863	1583	1770	5074		5074	1583		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	365	1770	#	0.21	0.21	371	0.98
Prot								
Perm								
Thru	LT	2	1863		0.00	0.21	390	0.01
Right	R	260	1583		0.16	0.21	332	0.78
Northbound								
Prot								
Perm								
Left	L	462	1770	#	0.26	0.26	455	1.02
Prot								
Perm								
Thru	T	919	5074		0.18	0.71	3595	0.26
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1572	5074		0.31	0.41	2094	0.75
Right	R	620	1583	#	0.39	0.41	653	0.95

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.86
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.98

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.98	0.21	37.4	1.000	371	0.49	42.3	0.0	79.7	E		
LT	0.01	0.21	29.7	1.000	390	0.11	0.0	0.0	29.7	C	66.0	E
R	0.78	0.21	35.5	1.000	332	0.33	11.6	0.0	47.1	D		
Northbound												
L	1.02	0.26	35.3	1.000	455	0.50	46.1	0.0	81.4	F		
T	0.26	0.71	4.9	1.000	3595	0.11	0.0	0.0	5.0	A	30.5	C
Southbound												

T	0.75	0.41	23.7	1.000	2094	0.31	1.6	0.0	25.3	C	32.4 C
R	0.95	0.41	26.9	1.000	653	0.46	23.5	0.0	50.4	D	

Intersection delay = 36.8 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	37.5	37.4	0.00	0.0	0.0	79.7
LT	0.0	0.00	37.5	29.7	0.00	0.0	0.0	29.7
R	0.0	0.00	37.5	35.5	0.00	0.0	0.0	47.1
Northbound								
L	0.0	0.00	35.3	35.3	0.00	1.8	0.0	81.4
T	0.0	0.00	13.8	4.9	0.00	0.0	0.0	5.0
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	27.9	23.7	0.00	0.0	0.0	25.3
R	0.0	0.00	27.9	26.9	0.00	0.0	0.0	50.4

Intersection Delay 36.8 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound				Southbound		
LaneGroup				L	LT	R	L	T			T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0			0.0	0.0	
Flow Rate				365	2	260	462	337			577	620	
So				1900	1900	1900	1900	1900			1900	1900	
No.Lanes	0	0	0	1	1	1	1	3	0	0	3	1	
SL				1770	1863	1583	1770	1862			1862	1583	
LnCapacity				371	390	332	455	1319			768	653	
Flow Ratio				0.2	0.0	0.2	0.3	0.2			0.3	0.4	
v/c Ratio				0.98	0.01	0.78	1.02	0.26			0.75	0.95	
Grn Ratio				0.21	0.21	0.21	0.26	0.71			0.41	0.41	
I Factor					1.000			1.000			1.000		
AT or PVG				3	3	3	3	3			3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00			1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00			1.00	1.00	
Q1				9.6	0.0	6.5	12.2	3.2			13.0	15.8	
kB				0.4	0.4	0.4	0.4	0.8			0.6	0.6	
Q2				3.9	0.0	1.2	5.5	0.3			1.7	4.8	
Q Average				13.5	0.0	7.7	17.7	3.5			14.7	20.6	
Q Spacing				25.0	25.0	25.0	25.0	25.0			25.0	25.0	
Q Storage				0	0	0	0	0			0	0	
Q S Ratio													
70th Percentile Output:													
fB%				1.2	1.2	1.2	1.2	1.2			1.2	1.2	
BOQ				15.8	0.1	9.1	20.6	4.1			17.2	23.9	
QSRatio													
85th Percentile Output:													
fB%				1.5	1.6	1.5	1.5	1.6			1.5	1.5	
BOQ				20.1	0.1	11.7	26.0	5.4			21.8	29.9	
QSRatio													
90th Percentile Output:													
fB%				1.6	1.8	1.7	1.6	1.7			1.6	1.5	
BOQ				21.6	0.1	12.8	27.7	6.0			23.4	31.8	
QSRatio													
95th Percentile Output:													
fB%				1.8	2.1	1.9	1.7	2.0			1.8	1.7	
BOQ				24.0	0.1	14.5	30.5	6.9			25.9	34.8	
QSRatio													
98th Percentile Output:													
fB%				2.1	2.7	2.3	2.0	2.5			2.0	1.9	
BOQ				27.7	0.1	17.3	34.6	8.5			29.7	39.2	
QSRatio													

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 NB Ramps

Inter.: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
LGConfig				L		LT	R	L		T		T	R
Volume				362	39	411		475	1089		788	295	
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol						0						0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	20.9	0.0				21.1	6.5	5.9 0.0
Yellow	3.2					3.2	3.6	3.6
All Red	0.5					0.5	0.5	0.5

Cycle Length: 70.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	528	1770	0.72	0.30	26.8	C		
LT	556	1863	0.07	0.30	17.7	B	36.2	D
R	473	1583	0.92	0.30	46.2	D		
Northbound								
L	534	1770	0.94	0.30	48.0	D		
T	2994	5074	0.38	0.59	7.7	A	19.9	B
Southbound								
T	1196	5074	0.69	0.24	26.2	C	30.1	C
R	373	1583	0.83	0.24	40.4	D		

Intersection Delay = 26.9 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Redhill Ave at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 NB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				362	39	411	475	1089			788	295
% Heavy Veh				2	2	2	2	2			2	2
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
PK 15 Vol				95	10	108	125	287			207	78
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900	1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
LGConfig				L		LT	R	L		T			T	R
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0	
Adj Flow				381	41	433	500	1146			829	311
%InSharedLn				0								
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000
Peds Bikes	0				0						0	
Buses				0	0	0	0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Arriv. Type				3	3	3	3	3			3	3
Unit Ext.				3.0	3.0	3.0	3.0	3.0			3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ext of g				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	20.9	0.0				21.1	6.5	5.9	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 70.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				362	39	411	475	1089			788	295
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
Adj flow				381	41	433	500	1146			829	311
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
Lane group				L		LT	R	L		T			T	R
Adj flow				381	41	433	500	1146			829	311
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	LT	R	L	T		T	R	
So				1900	1900	1900	1900	1900		1900	1900	
Lanes	0	0	0	1	1	1	1	3	0	3	1	
fW				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fHV				0.980	0.980	0.980	0.980	0.980		0.980	0.980	
fG				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fP				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fBB				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fA				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fLU				1.000	1.000	1.000	1.000	0.908		0.908	1.000	
fRT					1.000	0.850		1.000		1.000	0.850	
fLT				0.950	1.000		0.950	1.000		1.000		
Sec.												
fLpb				1.000	1.000		1.000	1.000		1.000		
fRpb					1.000	1.000		1.000		1.000	1.000	
S				1770	1863	1583	1770	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	381	1770		0.22	0.30	528	0.72
Prot								
Perm								
Thru	LT	41	1863		0.02	0.30	556	0.07
Right	R	433	1583	#	0.27	0.30	473	0.92
Northbound								
Prot								
Perm								
Left	L	500	1770	#	0.28	0.30	534	0.94
Prot								
Perm								
Thru	T	1146	5074		0.23	0.59	2994	0.38
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	829	5074		0.16	0.24	1196	0.69
Right	R	311	1583	#	0.20	0.24	373	0.83

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.75
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.90

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.72	0.30	21.9	1.000	528	0.28	4.8	0.0	26.8	C		
LT	0.07	0.30	17.6	1.000	556	0.11	0.1	0.0	17.7	B	36.2	D
R	0.92	0.30	23.7	1.000	473	0.43	22.5	0.0	46.2	D		
Northbound												
L	0.94	0.30	23.8	1.000	534	0.45	24.2	0.0	48.0	D		
T	0.38	0.59	7.6	1.000	2994	0.11	0.1	0.0	7.7	A	19.9	B
Southbound												

T	0.69	0.24	24.4	1.000	1196	0.26	1.8	0.0	26.2	C	30.1	C
R	0.83	0.24	25.4	1.000	373	0.37	14.9	0.0	40.4	D		

Intersection delay = 26.9 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	70.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	70.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	70.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	24.5	21.9	0.00	0.0	0.0	26.8
LT	0.0	0.00	24.5	17.6	0.00	0.0	0.0	17.7
R	0.0	0.00	24.5	23.7	0.00	0.0	0.0	46.2
Northbound								
L	0.0	0.00	24.4	23.8	0.00	0.0	0.0	48.0
T	0.0	0.00	14.3	7.6	0.00	0.0	0.0	7.7
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	26.8	24.4	0.00	0.0	0.0	26.2
R	0.0	0.00	26.8	25.4	0.00	0.0	0.0	40.4

Intersection Delay 26.9 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	LT	R	L	T		T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate				381	41	433	500	420		304	311	
So				1900	1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0	1	1	1	1	3	0	3	1	
SL				1770	1863	1583	1770	1862		1862	1583	
LnCapacity				528	556	473	534	1099		439	373	
Flow Ratio				0.2	0.0	0.3	0.3	0.2		0.2	0.2	
v/c Ratio				0.72	0.07	0.92	0.94	0.38		0.69	0.83	
Grn Ratio				0.30	0.30	0.30	0.30	0.59		0.24	0.24	
I Factor					1.000			1.000		1.000		
AT or PVG				3	3	3	3	3		3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Q1				6.6	0.6	8.1	9.5	4.3		5.4	5.8	
kB				0.4	0.4	0.4	0.4	0.6		0.4	0.3	
Q2				1.0	0.0	2.7	3.3	0.4		0.8	1.4	
Q Average				7.6	0.6	10.8	12.8	4.7		6.2	7.1	
Q Spacing				25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage				0	0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.2	1.2	1.2	1.2	1.2		1.2	1.2	
BOQ				9.0	0.7	12.7	15.0	5.6		7.3	8.5	
QSRatio												
85th Percentile Output:												
fB%				1.5	1.6	1.5	1.5	1.6		1.5	1.5	
BOQ				11.7	1.0	16.3	19.2	7.3		9.5	11.0	
QSRatio												
90th Percentile Output:												
fB%				1.7	1.8	1.6	1.6	1.7		1.7	1.7	
BOQ				12.7	1.1	17.6	20.6	8.1		10.5	12.0	
QSRatio												
95th Percentile Output:												
fB%				1.9	2.1	1.8	1.8	2.0		1.9	1.9	
BOQ				14.4	1.3	19.8	23.0	9.2		11.9	13.6	
QSRatio												
98th Percentile Output:												
fB%				2.3	2.7	2.1	2.1	2.4		2.3	2.3	
BOQ				17.2	1.6	23.1	26.6	11.3		14.3	16.3	
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	0	0	0	0	4	1	1	3	0
LGConfig		LT	R					T	R	L	T	
Volume	254	0	516					1041	611	482	1376	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	28.1	0.0				25.0	20.7	10.6	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	498	1774	0.54	0.28	31.6	C	113.6	F
R	445	1583	1.22	0.28	153.9	F		
Westbound								
Northbound								
T	2395	6765	0.46	0.35	25.0	C	59.5	E
R	560	1583	1.15	0.35	118.3	F		
Southbound								
L	443	1770	1.14	0.25	126.1	F		
T	3252	5074	0.45	0.64	9.1	A	39.5	D

Intersection Delay = 60.5 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Redhill Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	254	0	516					1041	611	482	1376	
% Heavy Veh	2	2	2					2	2	2	2	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
PK 15 Vol	67	0	136					274	161	127	362	
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat		1900	1900					1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	1	1	0	0	0	0	4	1	1	3	0
LGConfig		LT	R					T	R	L	T	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			
Adj Flow		267	543					1096	643	507	1448	
%InSharedLn												
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	
Peds Bikes		0			0			0				
Buses		0	0					0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0					0.0	0.0	0.0	0.0	
Arriv. Type		3	3					3	3	3	3	
Unit Ext.		3.0	3.0					3.0	3.0	3.0	3.0	
I Factor		1.000						1.000			1.000	
Lost Time		2.0	2.0					2.0	2.0	2.0	2.0	
Ext of g		2.0	2.0					2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	28.1	0.0				25.0	20.7	10.6	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	254	0	516					1041	611	482	1376	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
Adj flow	267	0	543					1096	643	507	1448	
No. Lanes	0	1	1	0	0	0	0	4	1	1	3	0
Lane group		LT	R					T	R	L	T	
Adj flow		267	543					1096	643	507	1448	
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound			Southbound	
LG	LT	R					T	R	L	T	
So	1900	1900					1900	1900	1900	1900	
Lanes	0 1	0 1	0	0	0	0	4	1	1	3	0
fW	1.000	1.000					1.000	1.000	1.000	1.000	
fHV	0.980	0.980					0.980	0.980	0.980	0.980	
fG	1.000	1.000					1.000	1.000	1.000	1.000	
fP	1.000	1.000					1.000	1.000	1.000	1.000	
fBB	1.000	1.000					1.000	1.000	1.000	1.000	
fA	1.000	1.000					1.000	1.000	1.000	1.000	
fLU	1.000	1.000					0.908	1.000	1.000	0.908	
fRT	1.000	0.850					1.000	0.850		1.000	
fLT	0.952						1.000		0.950	1.000	
Sec.											
fLpb	1.000						1.000		1.000	1.000	
fRpb	1.000	1.000					1.000	1.000		1.000	
S	1774	1583					6765	1583	1770	5074	
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	267	1774		0.15	0.28	498	0.54
Right	R	543	1583	#	0.34	0.28	445	1.22
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1096	6765		0.16	0.35	2395	0.46
Right	R	643	1583	#	0.41	0.35	560	1.15
Southbound								
Prot								
Perm								
Left	L	507	1770	#	0.29	0.25	443	1.14
Prot								
Perm								
Thru	T	1448	5074		0.29	0.64	3252	0.45
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.04
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.17

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
LT	0.54	0.28	30.4	1.000	498	0.14	1.1	0.0	31.6	C	113.6	F
R	1.22	0.28	36.0	1.000	445	0.50	117.9	0.0	153.9	F		
Westbound												
Northbound												
T	0.46	0.35	24.9	1.000	2395	0.11	0.1	0.0	25.0	C	59.5	E
R	1.15	0.35	32.3	1.000	560	0.50	86.0	0.0	118.3	F		
Southbound												
L	1.14	0.25	37.5	1.000	443	0.50	88.6	0.0	126.1	F		

T 0.45 0.64 9.0 1.000 3252 0.11 0.1 0.0 9.1 A 39.5 D

Intersection delay = 60.5 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	1.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	100.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

LT	0.0	0.00	36.0	30.4	0.00	0.0	0.0	31.6
R	0.0	0.00	36.0	36.0	0.00	24.5	0.0	153.9
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	32.3	24.9	0.00	0.0	0.0	25.0
R	0.0	0.00	32.3	32.3	0.00	20.8	0.0	118.3
Southbound								
L	0.0	0.00	37.5	37.5	0.00	16.0	0.0	126.1
T	0.0	0.00	18.0	9.0	0.00	0.0	0.0	9.1
	0.0						0.0	

Intersection Delay 60.5 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	LT	R					T	R		L	T	
Init Queue	0.0	0.0					0.0	0.0		0.0	0.0	
Flow Rate	267	543					301	643		507	531	
So	1900	1900					1900	1900		1900	1900	
No.Lanes	0 1	1		0	0	0	0 4	1		1	3	0
SL	1774	1583					1862	1583		1770	1862	
LnCapacity	498	445					659	560		443	1193	
Flow Ratio	0.2	0.3					0.2	0.4		0.3	0.3	
v/c Ratio	0.54	1.22					0.46	1.15		1.14	0.45	
Grn Ratio	0.28	0.28					0.35	0.35		0.25	0.64	
I Factor	1.000						1.000				1.000	
AT or PVG	3	3					3	3		3	3	
Pltn Ratio	1.00	1.00					1.00	1.00		1.00	1.00	
PF2	1.00	1.00					1.00	1.00		1.00	1.00	
Q1	6.3	15.1					6.4	17.9		14.1	7.4	
kB	0.5	0.5					0.6	0.5		0.5	0.8	
Q2	0.5	14.4					0.5	13.5		10.7	0.7	
Q Average	6.8	29.5					6.9	31.3		24.8	8.1	
Q Spacing	25.0	25.0					25.0	25.0		25.0	25.0	
Q Storage	0	0					0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.1					1.2	1.1		1.2	1.2	
BOQ	8.1	33.8					8.2	35.9		28.6	9.5	
QSRatio												
85th Percentile Output:												
fB%	1.5	1.4					1.5	1.4		1.4	1.5	
BOQ	10.5	41.6					10.6	44.0		35.4	12.3	
QSRatio												
90th Percentile Output:												
fB%	1.7	1.5					1.7	1.5		1.5	1.7	
BOQ	11.5	44.0					11.6	46.5		37.5	13.4	
QSRatio												
95th Percentile Output:												
fB%	1.9	1.6					1.9	1.6		1.7	1.9	
BOQ	13.0	47.6					13.2	50.3		40.9	15.2	
QSRatio												
98th Percentile Output:												
fB%	2.3	1.8					2.3	1.8		1.8	2.2	
BOQ	15.6	53.1					15.8	56.1		45.8	18.0	
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
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Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	0	0	0	0	4	1	1	3	0
LGConfig		LT	R					T	R	L	T	
Volume	454	0	306					1106	444	386	764	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	18.1	0.0				15.2	8.2	7.9	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	494	1774	0.97	0.28	55.4	E	44.1	D
R	441	1583	0.73	0.28	27.3	C		
Westbound								
Northbound								
T	2102	6765	0.55	0.31	19.0	B	27.9	C
R	492	1583	0.95	0.31	50.1	D		
Southbound								
L	414	1770	0.98	0.23	63.8	E		
T	3052	5074	0.26	0.60	6.2	A	25.5	C

Intersection Delay = 30.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Redhill Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	454	0	306					1106	444	386	764	
% Heavy Veh	2	2	2					2	2	2	2	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
PK 15 Vol	119	0	81					291	117	102	201	
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat		1900	1900					1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	1	1	0	0	0	0	4	1	1	3	0
LGConfig		LT	R					T	R	L	T	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			
Adj Flow		478	322					1164	467	406	804	
%InSharedLn												
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	
Peds Bikes		0			0			0				
Buses		0	0					0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0					0.0	0.0	0.0	0.0	
Arriv. Type		3	3					3	3	3	3	
Unit Ext.		3.0	3.0					3.0	3.0	3.0	3.0	
I Factor		1.000						1.000			1.000	
Lost Time		2.0	2.0					2.0	2.0	2.0	2.0	
Ext of g		2.0	2.0					2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	18.1	0.0			15.2	8.2	7.9	0.0
Yellow	3.2				3.2	3.6	3.6	
All Red	0.5				0.5	0.5	0.5	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	454	0	306					1106	444	386	764	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
Adj flow	478	0	322					1164	467	406	804	
No. Lanes	0	1	1	0	0	0	0	4	1	1	3	0
Lane group		LT	R					T	R	L	T	
Adj flow		478	322					1164	467	406	804	
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound			Southbound	
LG	LT	R					T	R	L	T	
So	1900	1900					1900	1900	1900	1900	
Lanes	0 1	0 1	0	0	0	0	4	1	1	3	0
fW	1.000	1.000					1.000	1.000	1.000	1.000	
fHV	0.980	0.980					0.980	0.980	0.980	0.980	
fG	1.000	1.000					1.000	1.000	1.000	1.000	
fP	1.000	1.000					1.000	1.000	1.000	1.000	
fBB	1.000	1.000					1.000	1.000	1.000	1.000	
fA	1.000	1.000					1.000	1.000	1.000	1.000	
fLU	1.000	1.000					0.908	1.000	1.000	0.908	
fRT	1.000	0.850					1.000	0.850		1.000	
fLT	0.952						1.000		0.950	1.000	
Sec.											
fLpb	1.000						1.000		1.000	1.000	
fRpb	1.000	1.000					1.000	1.000		1.000	
S	1774	1583					6765	1583	1770	5074	
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LT	478	1774	# 0.27	0.28	494	0.97
Right	R	322	1583	0.20	0.28	441	0.73
Westbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1164	6765	0.17	0.31	2102	0.55
Right	R	467	1583	# 0.30	0.31	492	0.95
Southbound							
Prot							
Perm							
Left	L	406	1770	# 0.23	0.23	414	0.98
Prot							
Perm							
Thru	T	804	5074	0.16	0.60	3052	0.26
Right							

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.79
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.96

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
LT	0.97	0.28	23.2	1.000	494	0.47	32.2	0.0	55.4	E	44.1	D
R	0.73	0.28	21.2	1.000	441	0.29	6.1	0.0	27.3	C		
Westbound												
Northbound												
T	0.55	0.31	18.6	1.000	2102	0.15	0.3	0.0	19.0	B	27.9	C
R	0.95	0.31	21.9	1.000	492	0.46	28.2	0.0	50.1	D		
Southbound												
L	0.98	0.23	24.8	1.000	414	0.48	39.0	0.0	63.8	E		

T 0.26 0.60 6.1 1.000 3052 0.11 0.0 0.0 6.2 A 25.5 C

Intersection delay = 30.6 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	1.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

LT	0.0	0.00	23.4	23.2	0.00	0.0	0.0	55.4
R	0.0	0.00	23.4	21.2	0.00	0.0	0.0	27.3
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	22.4	18.6	0.00	0.0	0.0	19.0
R	0.0	0.00	22.4	21.9	0.00	0.0	0.0	50.1
Southbound								
L	0.0	0.00	24.9	24.8	0.00	0.0	0.0	63.8
T	0.0	0.00	13.0	6.1	0.00	0.0	0.0	6.2
	0.0						0.0	

Intersection Delay 30.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup		LT	R				T	R		L	T	
Init Queue		0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate		478	322				320	467		406	295	
So		1900	1900				1900	1900		1900	1900	
No.Lanes	0	1	1	0	0	0	0	4	1	1	3	0
SL		1774	1583				1862	1583		1770	1862	
LnCapacity		494	441				578	492		414	1120	
Flow Ratio		0.3	0.2				0.2	0.3		0.2	0.2	
v/c Ratio		0.97	0.73				0.55	0.95		0.98	0.26	
Grn Ratio		0.28	0.28				0.31	0.31		0.23	0.60	
I Factor		1.000					1.000				1.000	
AT or PVG		3	3				3	3		3	3	
Pltn Ratio		1.00	1.00				1.00	1.00		1.00	1.00	
PF2		1.00	1.00				1.00	1.00		1.00	1.00	
Q1		8.5	5.3				4.8	8.2		7.3	2.5	
kB		0.4	0.3				0.4	0.4		0.3	0.6	
Q2		3.8	0.9				0.5	3.3		3.6	0.2	
Q Average		12.3	6.2				5.3	11.6		10.9	2.7	
Q Spacing		25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage		0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%		1.2	1.2				1.2	1.2		1.2	1.2	
BOQ		14.5	7.3				6.3	13.6		12.9	3.3	
QSRatio												
85th Percentile Output:												
fB%		1.5	1.5				1.6	1.5		1.5	1.6	
BOQ		18.5	9.5				8.2	17.4		16.5	4.3	
QSRatio												
90th Percentile Output:												
fB%		1.6	1.7				1.7	1.6		1.6	1.7	
BOQ		19.9	10.4				9.1	18.8		17.8	4.8	
QSRatio												
95th Percentile Output:												
fB%		1.8	1.9				1.9	1.8		1.8	2.0	
BOQ		22.2	11.9				10.3	21.0		20.0	5.5	
QSRatio												
98th Percentile Output:												
fB%		2.1	2.3				2.4	2.1		2.1	2.5	
BOQ		25.8	14.3				12.6	24.5		23.3	6.9	
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Newport Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	

Volume	371	61	340	30		110		1089	63		195	1590			
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0			12.0	12.0			
RTOR Vol			0			0				0					

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4		5	6	7	8
EB	Left		A			NB	Left			
	Thru		A				Thru	A	A	
	Right		A				Right	A	A	
	Peds						Peds			
WB	Left	A				SB	Left	A		
	Thru						Thru	A	A	A
	Right	A					Right			
	Peds						Peds			
NB	Right					EB	Right			
SB	Right					WB	Right			
Green		6.4	21.6	0.0			10.8	10.8	7.2	0.0
Yellow		3.6	3.6				3.2	3.9	3.9	
All Red		1.0	1.0				1.0	1.0	1.0	

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Flow (s)	Sat Rate	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	Approach LOS
Eastbound									
L	478	1770		0.82	0.27	38.1	D		
LT	503	1863		0.13	0.27	22.2	C	38.2	D
R	427	1583		0.84	0.27	41.3	D		
Westbound									
L	142	1770		0.23	0.08	35.3	D		
								78.7	E
R	127	1583		0.91	0.08	90.6	F		
Northbound									
TR	1441	5033		0.84	0.29	31.5	C	31.5	C
Southbound									
L	239	1770		0.86	0.14	59.2	E		
T	2404	5074		0.70	0.47	17.4	B	22.0	C

Intersection Delay = 30.2 (sec/veh) Intersection LOS = C

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Newport Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015

Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps N/S St: Newport Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	371	61	340	30		110		1089	63	195	1590	
% Heavy Veh	2	2	2	2		2		2	2	2	2	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol	98	16	89	8		29		287	17	51	418	
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900	1900	1900		1900		1900		1900	1900	
ParkExist												

NumPark					
No. Lanes	1 1 1	1 0 1	0 3 0	1 3 0	
LGConfig	L LT R	L R	TR	L T	
Lane Width	12.0 12.0 12.0	12.0 12.0	12.0	12.0 12.0	
RTOR Vol	0	0	0		
Adj Flow	391 64 358	32 116	1212	205 1674	
%InSharedLn	0				
Prop LTs	0.000		0.000	0.000	
Prop RTs	0.000 1.000	1.000	0.054	0.000	
Peds Bikes	0	0	0		
Buses	0 0 0	0 0	0	0 0	
%InProtPhase					

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Arriv. Type	3	3	3	3		3		3		3	3	
Unit Ext.	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	6.4	21.6	0.0		10.8	10.8	7.2	0.0
Yellow	3.6	3.6			3.2	3.9	3.9	
All Red	1.0	1.0			1.0	1.0	1.0	

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	371	61	340	30		110		1089	63	195	1590	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow	391	64	358	32		116		1146	66	205	1674	
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
Lane group	L	LT	R	L		R		TR		L	T	
Adj flow	391	64	358	32		116		1212		205	1674	
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.054			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LT	R	L		R		TR		L	T	
So	1900	1900	1900	1900		1900		1900		1900	1900	
Lanes	1	1	1	1	0	1	0	3	0	1	3	0
fW	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fHV	0.980	0.980	0.980	0.980		0.980		0.980		0.980	0.980	
fG	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fP	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fBB	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fA	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fLU	1.000	1.000	1.000	1.000		1.000		0.908		1.000	0.908	
fRT		1.000	0.850			0.850		0.992			1.000	
fLT	0.950	1.000		0.950				1.000		0.950	1.000	

Sec.

fLpb	1.000	1.000		1.000			1.000	1.000	1.000
fRpb		1.000	1.000			1.000	1.000		1.000
S	1770	1863	1583	1770		1583	5033	1770	5074

Sec.

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	391	1770		0.22	0.27	478	0.82
Prot								
Perm								
Thru	LT	64	1863		0.03	0.27	503	0.13
Right	R	358	1583	#	0.23	0.27	427	0.84
Westbound								
Prot								
Perm								
Left	L	32	1770		0.02	0.08	142	0.23
Prot								
Perm								
Thru								
Right	R	116	1583	#	0.07	0.08	127	0.91
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1212	5033	#	0.24	0.29	1441	0.84
Right								
Southbound								
Prot								
Perm								
Left	L	205	1770	#	0.12	0.14	239	0.86
Prot								
Perm								
Thru	T	1674	5074		0.33	0.47	2404	0.70
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.66
Total lost time per cycle, L = 18.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.85

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.82	0.27	27.4	1.000	478	0.36	10.7	0.0	38.1	D		
LT	0.13	0.27	22.1	1.000	503	0.11	0.1	0.0	22.2	C	38.2	D
R	0.84	0.27	27.6	1.000	427	0.37	13.8	0.0	41.3	D		
Westbound												
L	0.23	0.08	34.5	1.000	142	0.11	0.8	0.0	35.3	D		
											78.7	E
R	0.91	0.08	36.5	1.000	127	0.43	54.1	0.0	90.6	F		
Northbound												
TR	0.84	0.29	26.8	1.000	1441	0.38	4.7	0.0	31.5	C	31.5	C
Southbound												
L	0.86	0.14	33.8	1.000	239	0.39	25.3	0.0	59.2	E		
T	0.70	0.47	16.5	1.000	2404	0.26	0.9	0.0	17.4	B	22.0	C

Intersection delay = 30.2 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET

for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				

Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 1.000 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET

Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

Cycle length, C 80.0 sec

	EBLT	WBLT	NBLT	SBLT
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	29.2	27.4	0.00	0.0	0.0	38.1
LT	0.0	0.00	29.2	22.1	0.00	0.0	0.0	22.2
R	0.0	0.00	29.2	27.6	0.00	0.0	0.0	41.3
Westbound								
L	0.0	0.00	36.8	34.5	0.00	0.0	0.0	35.3
	0.0						0.0	
R	0.0	0.00	36.8	36.5	0.00	0.0	0.0	90.6
Northbound								
	0.0						0.0	
TR	0.0	0.00	28.5	26.8	0.00	0.0	0.0	31.5
	0.0						0.0	
Southbound								
L	0.0	0.00	34.6	33.8	0.00	0.0	0.0	59.2

T	0.0 0.0	0.00	21.0	16.5	0.00	0.0	0.0 0.0	17.4

Intersection Delay 30.2 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound	Southbound	
LaneGroup	L	LT	R	L	R	TR	L	T
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate	391	64	358	32	116	444	205	614
So	1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	1	1	1	1 0	1	0 3 0	1	3 0
SL	1770	1863	1583	1770	1583	1847	1770	1862
LnCapacity	478	503	427	142	127	529	239	882
Flow Ratio	0.2	0.0	0.2	0.0	0.1	0.2	0.1	0.3
v/c Ratio	0.82	0.13	0.84	0.23	0.91	0.84	0.86	0.70
Grn Ratio	0.27	0.27	0.27	0.08	0.08	0.29	0.14	0.47
I Factor		1.000		1.000		1.000		1.000
AT or PVG	3	3	3	3	3	3	3	3
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Q1	8.1	1.1	7.5	0.7	2.6	9.3	4.5	10.7
kB	0.4	0.4	0.4	0.2	0.2	0.4	0.3	0.6
Q2	1.6	0.1	1.7	0.1	1.1	1.9	1.3	1.3
Q Average	9.8	1.1	9.2	0.7	3.7	11.2	5.7	12.0
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage	0	0	0	0	0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
BOQ	11.5	1.4	10.8	0.9	4.3	13.2	6.8	14.1
QSRatio								
85th Percentile Output:								
fB%	1.5	1.6	1.5	1.6	1.6	1.5	1.5	1.5
BOQ	14.8	1.8	14.0	1.2	5.7	16.9	8.9	18.1
QSRatio								
90th Percentile Output:								
fB%	1.6	1.8	1.7	1.8	1.7	1.6	1.7	1.6
BOQ	16.1	2.0	15.2	1.3	6.3	18.2	9.7	19.5
QSRatio								
95th Percentile Output:								
fB%	1.8	2.1	1.9	2.1	2.0	1.8	1.9	1.8
BOQ	18.0	2.3	17.1	1.5	7.3	20.4	11.1	21.7
QSRatio								
98th Percentile Output:								
fB%	2.2	2.6	2.2	2.6	2.5	2.1	2.3	2.1
BOQ	21.2	3.0	20.1	1.9	9.0	23.8	13.4	25.2
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Newport Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Volume	409	45	547	69		181		1667	72	229	1092	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	9.3	36.5	0.0		10.3	15.9	19.8	0.0
Yellow	3.6	3.6			3.2	3.9	3.9	
All Red	1.0	1.0			1.0	1.0	1.0	

Cycle Length: 115.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	562	1770	0.77	0.32	41.7	D		
LT	591	1863	0.08	0.32	27.5	C	87.6	F
R	502	1583	1.15	0.32	126.7	F		
Westbound								
L	143	1770	0.51	0.08	53.7	D		
							239.8	F
R	128	1583	1.49	0.08	310.9	F		
Northbound								
TR	1780	5043	1.03	0.35	66.2	E	66.2	E
Southbound								
L	159	1770	1.52	0.09	313.9	F		
T	2431	5074	0.47	0.48	20.3	C	71.2	E

Intersection Delay = 82.8 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: PM
Intersection: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2015
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Newport Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	409	45	547	69		181		1667	72	229	1092	
% Heavy Veh	2	2	2	2		2		2	2	2	2	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol	108	12	144	18		48		439	19	60	287	
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900	1900	1900		1900		1900		1900	1900	
ParkExist												
NumPark												
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol		0			0			0				
Adj Flow	431	47	576	73		191		1831		241	1149	
%InSharedLn	0											
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.042			0.000	
Peds Bikes	0			0			0					
Buses	0	0	0	0		0		0		0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Arriv. Type	3	3	3	3		3		3		3	3	
Unit Ext.	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	9.3	36.5	0.0		10.3	15.9	19.8	0.0
Yellow	3.6	3.6			3.2	3.9	3.9	
All Red	1.0	1.0			1.0	1.0	1.0	

Cycle Length: 115.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	409	45	547	69		181		1667	72	229	1092	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow	431	47	576	73		191		1755	76	241	1149	
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
Lane group	L	LT	R	L		R		TR		L	T	
Adj flow	431	47	576	73		191		1831		241	1149	
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.042			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LT	R	L		R	TR			L	T	
So	1900	1900	1900	1900		1900	1900			1900	1900	
Lanes	1	1	1	1	0	1	0	3	0	1	3	0
fW	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fHV	0.980	0.980	0.980	0.980		0.980		0.980		0.980	0.980	
fG	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fP	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fBB	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fA	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fLU	1.000	1.000	1.000	1.000		1.000		0.908		1.000	0.908	
fRT		1.000	0.850			0.850		0.994			1.000	
fLT	0.950	1.000		0.950				1.000		0.950	1.000	
Sec.												
fLpb	1.000	1.000		1.000				1.000		1.000	1.000	
fRpb		1.000	1.000			1.000		1.000			1.000	
S	1770	1863	1583	1770		1583		5043		1770	5074	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	431	1770		0.24	0.32	562	0.77
Prot								
Perm								
Thru	LT	47	1863		0.03	0.32	591	0.08
Right	R	576	1583	#	0.36	0.32	502	1.15
Westbound								
Prot								
Perm								
Left	L	73	1770		0.04	0.08	143	0.51
Prot								
Perm								
Thru								
Right	R	191	1583	#	0.12	0.08	128	1.49
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1831	5043	#	0.36	0.35	1780	1.03
Right								
Southbound								
Prot								
Perm								
Left	L	241	1770	#	0.14	0.09	159	1.52
Prot								
Perm								
Thru	T	1149	5074		0.23	0.48	2431	0.47
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.98
Total lost time per cycle, L = 18.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.17

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.77	0.32	35.4	1.000	562	0.32	6.3	0.0	41.7	D		
LT	0.08	0.32	27.5	1.000	591	0.11	0.1	0.0	27.5	C	87.6	F
R	1.15	0.32	39.3	1.000	502	0.50	87.5	0.0	126.7	F		
Westbound												
L	0.51	0.08	50.7	1.000	143	0.12	3.1	0.0	53.7	D		
											239.8	F
R	1.49	0.08	52.9	1.000	128	0.50	258.1	0.0	310.9	F		
Northbound												
TR	1.03	0.35	37.2	1.000	1780	0.50	29.0	0.0	66.2	E	66.2	E
Southbound												
L	1.52	0.09	52.4	1.000	159	0.50	261.6	0.0	313.9	F		

T 0.47 0.48 20.2 1.000 2431 0.11 0.1 0.0 20.3 C 71.2 E

Intersection delay = 82.8 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 115.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 115.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	115.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	39.3	35.4	0.00	0.0	0.0	41.7

LT	0.0	0.00	39.3	27.5	0.00	0.0	0.0	27.5
R	0.0	0.00	39.3	39.3	0.00	18.5	0.0	126.7
Westbound								
L	0.0	0.00	52.9	50.7	0.00	0.0	0.0	53.7
	0.0						0.0	
R	0.0	0.00	52.9	52.9	0.00	15.8	0.0	310.9
Northbound								
	0.0						0.0	
TR	0.0	0.00	37.2	37.2	0.00	12.8	0.0	66.2
	0.0						0.0	
Southbound								
L	0.0	0.00	52.4	52.4	0.00	20.5	0.0	313.9
T	0.0	0.00	30.0	20.2	0.00	0.0	0.0	20.3
	0.0						0.0	

Intersection Delay 82.8 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LT	R	L		R	TR			L	T	
Init Queue	0.0	0.0	0.0	0.0		0.0	0.0			0.0	0.0	
Flow Rate	431	47	576	73		191	672			241	421	
So	1900	1900	1900	1900		1900	1900			1900	1900	
No.Lanes	1	1	1	1	0	1	0	3	0	1	3	0
SL	1770	1863	1583	1770		1583	1851			1770	1862	
LnCapacity	562	591	502	143		128	653			159	892	
Flow Ratio	0.2	0.0	0.4	0.0		0.1	0.4			0.1	0.2	
v/c Ratio	0.77	0.08	1.15	0.51		1.49	1.03			1.52	0.47	
Grn Ratio	0.32	0.32	0.32	0.08		0.08	0.35			0.09	0.48	
I Factor		1.000			1.000		1.000				1.000	
AT or PVG	3	3	3	3		3	3			3	3	
Pltn Ratio	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00	
PF2	1.00	1.00	1.00	1.00		1.00	1.00			1.00	1.00	
Q1	12.4	1.1	18.4	2.2		6.1	21.5			7.7	9.1	
kB	0.6	0.6	0.5	0.2		0.2	0.6			0.3	0.7	
Q2	1.7	0.1	12.3	0.3		8.5	8.5			11.0	0.7	
Q Average	14.1	1.1	30.7	2.5		14.6	30.0			18.7	9.7	
Q Spacing	25.0	25.0	25.0	25.0		25.0	25.0			25.0	25.0	
Q Storage	0	0	0	0		0	0			0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.1	1.2		1.2	1.1			1.2	1.2	
BOQ	16.5	1.3	35.2	3.0		17.1	34.4			21.7	11.4	
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6	1.4	1.6		1.5	1.4			1.5	1.5	
BOQ	21.0	1.8	43.3	3.9		21.7	42.3			27.3	14.7	
QSRatio												
90th Percentile Output:												
fB%	1.6	1.8	1.5	1.8		1.6	1.5			1.6	1.6	
BOQ	22.5	2.0	45.7	4.4		23.3	44.6			29.1	16.0	
QSRatio												
95th Percentile Output:												
fB%	1.8	2.1	1.6	2.0		1.8	1.6			1.7	1.8	
BOQ	25.0	2.3	49.4	5.0		25.8	48.3			32.0	18.0	
QSRatio												
98th Percentile Output:												
fB%	2.0	2.6	1.8	2.5		2.0	1.8			1.9	2.2	
BOQ	28.8	2.9	55.1	6.3		29.6	53.9			36.2	21.1	
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 NB Ramps

Inter.: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Volume				783		453		797	580		1047	930
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		24.3	0.0			9.6	4.4	0.0
Yellow		4.3				4.3	3.6	
All Red		3.5				3.5	2.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1392	3437	0.59	0.41	14.6	B		
							16.6	B
R	641	1583	0.74	0.41	19.9	B		
Northbound								
T	1844	5074	0.45	0.36	14.7	B	8.6	A
R	1583	1583	0.39	1.00	0.2	A		
Southbound								
T	1844	5074	0.60	0.36	16.1	B	8.9	A
R	1583	1583	0.62	1.00	0.7	A		

Intersection Delay = 10.9 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Culver at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 NB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				783		453		797	580		1047	930
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				206		119		210	153		276	245
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				824		477		839	611		1102	979
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		24.3	0.0			9.6	4.4	0.0
Yellow		4.3				4.3	3.6	
All Red		3.5				3.5	2.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				783		453		797	580		1047	930
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				824		477		839	611		1102	979
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
Lane group				L		R		T	R		T	R
Adj flow				824		477		839	611		1102	979
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		T		R
So				1900		1900	1900	1900		1900		1900
Lanes	0	0	0	2	0	1	0 3	1	0	3		1
fW				1.000		1.000	1.000	1.000		1.000		1.000
fHV				0.980		0.980	0.980	0.980		0.980		0.980
fG				1.000		1.000	1.000	1.000		1.000		1.000
fP				1.000		1.000	1.000	1.000		1.000		1.000
fBB				1.000		1.000	1.000	1.000		1.000		1.000
fA				1.000		1.000	1.000	1.000		1.000		1.000
fLU				0.971		1.000	0.908	1.000		0.908		1.000
fRT						0.850	1.000	0.850		1.000		0.850
fLT				0.950			1.000			1.000		
Sec.												
fLpb				1.000			1.000			1.000		
fRpb						1.000	1.000	1.000		1.000		1.000
S				3437		1583	5074	1583		5074		1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Westbound							
Prot							
Perm							
Left	L	824	3437	0.24	0.41	1392	0.59
Prot							
Perm							
Thru							
Right	R	477	1583	0.30	0.41	641	0.74
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	839	5074	0.17	0.36	1844	0.45
Right	R	611	1583	0.39	1.00	1583	0.39
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1102	5074	0.22	0.36	1844	0.60
Right	R	979	1583	# 0.62	1.00	1583	0.62

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.62
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.62

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor Del k	d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.59	0.41	14.0	1.000	1392	0.18	0.7	0.0	14.6	B		
											16.6	B
R	0.74	0.41	15.2	1.000	641	0.30	4.7	0.0	19.9	B		
Northbound												
T	0.45	0.36	14.6	1.000	1844	0.11	0.2	0.0	14.7	B	8.6	A
R	0.39	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.60	0.36	15.5	1.000	1844	0.19	0.5	0.0	16.1	B	8.9	A
R	0.62	1.00	0.0	0.950	1583	0.20	0.7	0.0	0.7	A		

Intersection delay = 10.9 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	17.8	14.0	0.00	0.0	0.0	14.6
	0.0						0.0	
R	0.0	0.00	17.8	15.2	0.00	0.0	0.0	19.9
Northbound								
	0.0						0.0	
T	0.0	0.00	19.1	14.6	0.00	0.0	0.0	14.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	19.1	15.5	0.00	0.0	0.0	16.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.7

Intersection Delay 10.9 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				424	477	308	611	404	979
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	0 1	0 3	1	0 3	1
SL				1770	1583	1862	1583	1862	1583
LnCapacity				716	641	676	1583	676	1583
Flow Ratio				0.2	0.3	0.2	0.4	0.2	0.6
v/c Ratio				0.59	0.74	0.46	0.39	0.60	0.62
Grn Ratio				0.41	0.41	0.36	1.00	0.36	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00		1.00	
Q1				5.5	6.8	3.9		5.5	
kB				0.4	0.4	0.4	0.7	0.4	0.7
Q2				0.6	1.1	0.4	0.4	0.6	1.1
Q Average				6.2	7.9	4.3		6.1	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2	1.2	1.2		1.2	
BOQ				7.3	9.4	5.1		7.2	
QSRatio									
85th Percentile Output:									
fB%				1.5	1.5	1.6		1.5	
BOQ				9.5	12.1	6.7		9.4	
QSRatio									
90th Percentile Output:									
fB%				1.7	1.7	1.7		1.7	
BOQ				10.4	13.2	7.4		10.3	
QSRatio									
95th Percentile Output:									
fB%				1.9	1.9	2.0		1.9	
BOQ				11.9	14.9	8.4		11.8	
QSRatio									
98th Percentile Output:									
fB%				2.3	2.2	2.4		2.3	
BOQ				14.3	17.8	10.3		14.2	
QSRatio									

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 NB Ramps

Inter.: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Volume				455		784		1826	422		1091	663
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left	A				SB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	46.0	0.0				8.8	23.5	0.0	
Yellow	4.3					4.3	3.6		
All Red	3.5					3.5	2.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1581	3437	0.30	0.46	17.0	B		
							71.7	E
R	728	1583	1.13	0.46	103.5	F		
Northbound								
T	2035	5074	0.94	0.40	38.7	D	31.5	C
R	1583	1583	0.28	1.00	0.1	A		
Southbound								
T	2035	5074	0.56	0.40	23.6	C	14.7	B
R	1583	1583	0.44	1.00	0.2	A		

Intersection Delay = 35.4 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Culver at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 NB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				455		784		1826	422		1091	663
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				120		206		481	111		287	174
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				479		825		1922	444		1148	698
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		46.0	0.0			8.8	23.5	0.0
Yellow		4.3				4.3	3.6	
All Red		3.5				3.5	2.5	

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				455		784		1826	422		1091	663
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				479		825		1922	444		1148	698
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
Lane group				L		R		T	R		T	R
Adj flow				479		825		1922	444		1148	698
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		T		R
So				1900		1900	1900	1900		1900		1900
Lanes	0	0	0	2	0	1	0 3	1	0	3		1
fW				1.000		1.000	1.000	1.000		1.000		1.000
fHV				0.980		0.980	0.980	0.980		0.980		0.980
fG				1.000		1.000	1.000	1.000		1.000		1.000
fP				1.000		1.000	1.000	1.000		1.000		1.000
fBB				1.000		1.000	1.000	1.000		1.000		1.000
fA				1.000		1.000	1.000	1.000		1.000		1.000
fLU				0.971		1.000	0.908	1.000		0.908		1.000
fRT						0.850	1.000	0.850		1.000		0.850
fLT				0.950			1.000			1.000		
Sec.												
fLpb				1.000			1.000			1.000		
fRpb						1.000	1.000	1.000		1.000		1.000
S				3437		1583	5074	1583		5074		1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	479	3437		0.14	0.46	1581	0.30
Prot								
Perm								
Thru								
Right	R	825	1583	#	0.52	0.46	728	1.13
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1922	5074	#	0.38	0.40	2035	0.94
Right	R	444	1583		0.28	1.00	1583	0.28
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1148	5074		0.23	0.40	2035	0.56
Right	R	698	1583		0.44	1.00	1583	0.44

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.90
Total lost time per cycle, L = 13.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.05

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.30	0.46	16.9	1.000	1581	0.11	0.1	0.0	17.0	B		
											71.7	E
R	1.13	0.46	27.0	1.000	728	0.50	76.5	0.0	103.5	F		
Northbound												
T	0.94	0.40	28.9	1.000	2035	0.46	9.9	0.0	38.7	D	31.5	C
R	0.28	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.56	0.40	23.2	1.000	2035	0.16	0.4	0.0	23.6	C	14.7	B
R	0.44	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 35.4 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	100.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	27.0	16.9	0.00	0.0	0.0	17.0
	0.0						0.0	
R	0.0	0.00	27.0	27.0	0.00	24.3	0.0	103.5
Northbound								
	0.0						0.0	
T	0.0	0.00	30.0	28.9	0.00	0.0	0.0	38.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	30.0	23.2	0.00	0.0	0.0	23.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 35.4 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				246	825	705	444	421	698
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2 0	1	0 3	1	0 3	1
SL				1770	1583	1862	1583	1862	1583
LnCapacity				814	728	747	1583	747	1583
Flow Ratio				0.1	0.5	0.4	0.3	0.2	0.4
v/c Ratio				0.30	1.13	0.94	0.28	0.56	0.44
Grn Ratio				0.46	0.46	0.40	1.00	0.40	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00		1.00	
Q1				4.3	22.9	18.9		9.1	
kB				0.6	0.6	0.6	1.0	0.6	1.0
Q2				0.3	16.0	5.2	0.4	0.8	0.8
Q Average				4.6	38.9	24.1		9.8	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2	1.1	1.2		1.2	
BOQ				5.4	44.3	27.8		11.6	
QSRatio									
85th Percentile Output:									
fB%				1.6	1.4	1.4		1.5	
BOQ				7.1	53.8	34.5		14.9	
QSRatio									
90th Percentile Output:									
fB%				1.7	1.5	1.5		1.6	
BOQ				7.8	56.8	36.6		16.2	
QSRatio									
95th Percentile Output:									
fB%				2.0	1.6	1.7		1.8	
BOQ				9.0	61.1	39.9		18.2	
QSRatio									
98th Percentile Output:									
fB%				2.4	1.7	1.9		2.2	
BOQ				11.0	68.2	44.7		21.3	
QSRatio									

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 SB Ramps

Inter.: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	309	0	520					1055	242		1531	253
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	P				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	23.2	0.0				4.7	12.4	0.0	
Yellow	3.6					4.3	4.3		
All Red	2.5					2.5	2.5		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	684	1770	0.48	0.39	14.3	B		
LTR	720	1863	0.00	0.39	11.3	B	25.9	C
R	612	1583	0.89	0.39	32.8	C		
Westbound								
Northbound								
T	2021	5074	0.55	0.40	14.2	B	11.6	B
R	1583	1583	0.16	1.00	0.0+	A		
Southbound								
T	2021	5074	0.80	0.40	18.3	B	15.7	B
R	1583	1583	0.17	1.00	0.1	A		

Intersection Delay = 16.5 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Culver at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	309	0	520					1055	242		1531	253
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	81	0	137					278	64		403	67
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	325	0	547					1111	255		1612	266
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	P				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	23.2	0.0			4.7	12.4	0.0	
Yellow	3.6				4.3	4.3		
All Red	2.5				2.5	2.5		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	309	0	520					1055	242		1531	253
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	325	0	547					1111	255		1612	266
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR R					T	R		T	R
Adj flow	325	0	547					1111	255		1612	266
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound							Northbound							Southbound						
LG	L		LTR	R											T	R						T	R				
So	1900		1900	1900											1900	1900						1900	1900				
Lanes	1		1		0		0		0		0				3	1		0				3	1				
fW	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fHV	0.980		0.980	0.980											0.980	0.980						0.980	0.980				
fG	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fP	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fBB	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fA	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fLU	1.000		1.000	1.000											0.908	1.000						0.908	1.000				
fRT			1.000	0.850											1.000	0.850						1.000	0.850				
fLT	0.950		1.000												1.000							1.000					
Sec.																											
fLpb	1.000		1.000												1.000							1.000					
fRpb			1.000	1.000											1.000	1.000						1.000	1.000				
S	1770		1863	1583											5074	1583						5074	1583				
Sec.																											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	325	1770		0.18	0.39	684	0.48
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.39	720	0.00
Right	R	547	1583	#	0.35	0.39	612	0.89
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1111	5074		0.22	0.40	2021	0.55
Right	R	255	1583		0.16	1.00	1583	0.16
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1612	5074	#	0.32	0.40	2021	0.80
Right	R	266	1583		0.17	1.00	1583	0.17

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.66
Total lost time per cycle, L = 12.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.84

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.48	0.39	13.8	1.000	684	0.11	0.5	0.0	14.3	B		
LTR	0.00	0.39	11.3	1.000	720	0.50	0.0	0.0	11.3	B	25.9	C
R	0.89	0.39	17.2	1.000	612	0.42	15.6	0.0	32.8	C		
Westbound												
Northbound												
T	0.55	0.40	13.9	1.000	2021	0.15	0.3	0.0	14.2	B	11.6	B
R	0.16	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Southbound												

T	0.80	0.40	15.9	1.000	2021	0.34	2.3	0.0	18.3	B	15.7	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 16.5 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	18.4	13.8	0.00	0.0	0.0	14.3

LTR	0.0	0.00	18.4	11.3	0.00	0.0	0.0	11.3
R	0.0	0.00	18.4	17.2	0.00	0.0	0.0	32.8
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	18.0	13.9	0.00	0.0	0.0	14.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Southbound								
	0.0						0.0	
T	0.0	0.00	18.0	15.9	0.00	0.0	0.0	18.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 16.5 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup	L	LTR	R				T	R	T	R
Init Queue	0.0	0.0	0.0				0.0	0.0	0.0	0.0
Flow Rate	325	0	547				407	255	591	266
So	1900	1900	1900				1900	1900	1900	1900
No.Lanes	1	1	1	0	0	0	3	1	3	1
SL	1770	1863	1583				1862	1583	1862	1583
LnCapacity	684	720	612				741	1583	741	1583
Flow Ratio	0.2	0.0	0.3				0.2	0.2	0.3	0.2
v/c Ratio	0.48	0.00	0.89				0.55	0.16	0.80	0.17
Grn Ratio	0.39	0.39	0.39				0.40	1.00	0.40	1.00
I Factor		1.000					1.000		1.000	
AT or PVG	3	3	3				3	3	3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00				1.00		1.00	
Q1	4.1	0.0	8.5				5.2		8.7	
kB	0.4	0.7	0.4				0.5	0.7	0.5	0.7
Q2	0.4	0.0	2.6				0.5	0.1	1.6	0.1
Q Average	4.5	0.0	11.1				5.8		10.3	
Q Spacing	25.0	25.0	25.0				25.0	25.0	25.0	25.0
Q Storage	0	0	0				0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.3	1.2				1.2		1.2	
BOQ	5.3	0.0	13.1				6.8		12.2	
QSRatio										
85th Percentile Output:										
fB%	1.6	1.7	1.5				1.5		1.5	
BOQ	6.9	0.0	16.8				8.9		15.6	
QSRatio										
90th Percentile Output:										
fB%	1.7	2.0	1.6				1.7		1.6	
BOQ	7.7	0.0	18.1				9.8		16.9	
QSRatio										
95th Percentile Output:										
fB%	2.0	2.6	1.8				1.9		1.8	
BOQ	8.8	0.0	20.3				11.2		19.0	
QSRatio										
98th Percentile Output:										
fB%	2.4	3.2	2.1				2.3		2.2	
BOQ	10.7	0.0	23.6				13.5		22.2	
QSRatio										

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 SB Ramps

Inter.: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	833	0	597					1462	651		1156	301
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	P				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	37.4	0.0				6.3	11.6	0.0	
Yellow	3.6					4.3	4.3		
All Red	2.5					2.5	2.5		

Cycle Length: 75.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	883	1770	0.99	0.50	47.2	D		
LTR	929	1863	0.00	0.50	9.4	A	36.4	D
R	789	1583	0.80	0.50	21.3	C		
Westbound								
Northbound								
T	1671	5074	0.92	0.33	33.0	C	22.9	C
R	1583	1583	0.43	1.00	0.2	A		
Southbound								
T	1671	5074	0.73	0.33	23.8	C	18.9	B
R	1583	1583	0.20	1.00	0.1	A		

Intersection Delay = 25.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Culver at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	833	0	597					1462	651		1156	301
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	219	0	157					385	171		304	79
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	877	0	628					1539	685		1217	317
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	P				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	37.4	0.0			6.3	11.6	0.0	
Yellow	3.6				4.3	4.3		
All Red	2.5				2.5	2.5		

Cycle Length: 75.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	833	0	597					1462	651		1156	301
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	877	0	628					1539	685		1217	317
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	877	0	628					1539	685		1217	317
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound				Northbound			Southbound	
LG	L	LTR	R					T	R		T	R
So	1900	1900	1900					1900	1900		1900	1900
Lanes	1	1	1	0	0	0	0	3	1	0	3	1
fW	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980					0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fLU	1.000	1.000	1.000					0.908	1.000		0.908	1.000
fRT		1.000	0.850					1.000	0.850		1.000	0.850
fLT	0.950	1.000						1.000			1.000	
Sec.												
fLpb	1.000	1.000						1.000			1.000	
fRpb		1.000	1.000					1.000	1.000		1.000	1.000
S	1770	1863	1583					5074	1583		5074	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	877	1770	#	0.50	0.50	883	0.99
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.50	929	0.00
Right	R	628	1583		0.40	0.50	789	0.80
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1539	5074	#	0.30	0.33	1671	0.92
Right	R	685	1583		0.43	1.00	1583	0.43
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1217	5074		0.24	0.33	1671	0.73
Right	R	317	1583		0.20	1.00	1583	0.20

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.80
Total lost time per cycle, L = 12.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.96

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.99	0.50	18.7	1.000	883	0.49	28.5	0.0	47.2	D		
LTR	0.00	0.50	9.4	1.000	929	0.50	0.0	0.0	9.4	A	36.4	D
R	0.80	0.50	15.6	1.000	789	0.34	5.7	0.0	21.3	C		
Westbound												
Northbound												
T	0.92	0.33	24.2	1.000	1671	0.44	8.8	0.0	33.0	C	22.9	C
R	0.43	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.73	0.33	22.2	1.000	1671	0.29	1.6	0.0	23.8	C	18.9	B
R	0.20	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 25.6 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	75.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	75.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	75.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	18.8	18.7	0.00	0.0	0.0	47.2

LTR	0.0	0.00	18.8	9.4	0.00	0.0	0.0	9.4
R	0.0	0.00	18.8	15.6	0.00	0.0	0.0	21.3
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	25.1	24.2	0.00	0.0	0.0	33.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	25.1	22.2	0.00	0.0	0.0	23.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 25.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup	L	LTR	R				T	R	T	R
Init Queue	0.0	0.0	0.0				0.0	0.0	0.0	0.0
Flow Rate	877	0	628				564	685	446	317
So	1900	1900	1900				1900	1900	1900	1900
No.Lanes	1	1	1	0	0	0	3	1	3	1
SL	1770	1863	1583				1862	1583	1862	1583
LnCapacity	883	929	789				613	1583	613	1583
Flow Ratio	0.5	0.0	0.4				0.3	0.4	0.2	0.2
v/c Ratio	0.99	0.00	0.80				0.92	0.43	0.73	0.20
Grn Ratio	0.50	0.50	0.50				0.33	1.00	0.33	1.00
I Factor		1.000					1.000		1.000	
AT or PVG	3	3	3				3	3	3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00				1.00		1.00	
Q1	18.1	0.0	10.9				11.3		8.2	
kB	0.6	1.0	0.5				0.5	0.8	0.5	0.8
Q2	7.6	0.0	1.9				3.4	0.6	1.2	0.2
Q Average	25.7	0.0	12.8				14.7		9.4	
Q Spacing	25.0	25.0	25.0				25.0	25.0	25.0	25.0
Q Storage	0	0	0				0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.3	1.2				1.2		1.2	
BOQ	29.6	0.0	15.0				17.2		11.0	
QSRatio										
85th Percentile Output:										
fB%	1.4	1.7	1.5				1.5		1.5	
BOQ	36.7	0.0	19.1				21.8		14.2	
QSRatio										
90th Percentile Output:										
fB%	1.5	2.0	1.6				1.6		1.7	
BOQ	38.8	0.0	20.6				23.4		15.5	
QSRatio										
95th Percentile Output:										
fB%	1.6	2.6	1.8				1.8		1.9	
BOQ	42.3	0.0	23.0				26.0		17.4	
QSRatio										
98th Percentile Output:										
fB%	1.8	3.2	2.1				2.0		2.2	
BOQ	47.3	0.0	26.5				29.8		20.5	
QSRatio										

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 NB Ramps

Inter.: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Volume				1448		914		1646	500		1672	1620
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left	A				SB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right	A	A		
Green	21.7	0.0				15.0	5.3	0.0	
Yellow	3.6					4.7	4.7		
All Red	2.0					1.5	1.5		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1743	4820	0.87	0.36	23.2	C		
							14.5	B
R	1583	1583	0.61	1.00	0.7	A		
Northbound								
T	2241	5074	0.77	0.44	15.9	B	12.3	B
R	1583	1583	0.33	1.00	0.1	A		
Southbound								
T	2988	6765	0.59	0.44	12.9	B	29.5	C
R	1583	1583	1.08	1.00	46.5	D		

Intersection Delay = 20.2 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Jamboree at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1448		914		1646	500		1672	1620
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				381		241		433	132		440	426
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				1524		962		1733	526		1760	1705
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right	A	A	
Green		21.7	0.0			15.0	5.3	0.0
Yellow		3.6				4.7	4.7	
All Red		2.0				1.5	1.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1448		914		1646	500		1672	1620
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				1524		962		1733	526		1760	1705
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
Lane group				L		R		T	R		T	R
Adj flow				1524		962		1733	526		1760	1705
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T	R		T	R	
So			1900		1900		1900	1900		1900	1900	
Lanes	0	0	3	0	1	0	3	1	0	4	1	
fW			1.000		1.000		1.000	1.000		1.000	1.000	
fHV			0.980		0.980		0.980	0.980		0.980	0.980	
fG			1.000		1.000		1.000	1.000		1.000	1.000	
fP			1.000		1.000		1.000	1.000		1.000	1.000	
fBB			1.000		1.000		1.000	1.000		1.000	1.000	
fA			1.000		1.000		1.000	1.000		1.000	1.000	
fLU			0.908		1.000		0.908	1.000		0.908	1.000	
fRT					0.850		1.000	0.850		1.000	0.850	
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000	1.000		1.000	1.000	
S			4820		1583		5074	1583		6765	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Westbound							
Prot							
Perm							
Left	L	1524	4820	0.32	0.36	1743	0.87
Prot							
Perm							
Thru							
Right	R	962	1583	0.61	1.00	1583	0.61
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1733	5074	0.34	0.44	2241	0.77
Right	R	526	1583	0.33	1.00	1583	0.33
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1760	6765	0.26	0.44	2988	0.59
Right	R	1705	1583	# 1.08	1.00	1583	1.08

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.08
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.08

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
Westbound												
L	0.87	0.36	17.9	1.000	1743	0.40	5.3	0.0	23.2	C		
											14.5	B
R	0.61	1.00	0.0	0.950	1583	0.19	0.7	0.0	0.7	A		
Northbound												
T	0.77	0.44	14.2	1.000	2241	0.32	1.7	0.0	15.9	B	12.3	B
R	0.33	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.59	0.44	12.6	1.000	2988	0.18	0.3	0.0	12.9	B	29.5 C
R	1.08	1.00	0.0	0.950	1583	0.50	46.5	0.0	46.5	D	

Intersection delay = 20.2 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.2	17.9	0.00	0.0	0.0	23.2
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.7
Northbound								
	0.0						0.0	
T	0.0	0.00	16.8	14.2	0.00	0.0	0.0	15.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	16.8	12.6	0.00	0.0	0.0	12.9
R	0.0	0.00	0.0	0.0	0.00	30.5	0.0	46.5

Intersection Delay 20.2 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				559	962	636	526	484	1705
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	3	0 1	0 3	1	0 4	1
SL				1769	1583	1862	1583	1862	1583
LnCapacity				639	1583	822	1583	822	1583
Flow Ratio				0.3	0.6	0.3	0.3	0.3	1.1
v/c Ratio				0.87	0.61	0.77	0.33	0.59	1.08
Grn Ratio				0.36	1.00	0.44	1.00	0.44	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00		1.00		1.00	
Q1				8.7		9.0		6.1	
kB				0.4	0.7	0.5	0.7	0.5	0.7
Q2				2.3	1.1	1.5	0.4	0.7	22.1
Q Average				11.0		10.5		6.8	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2		1.2		1.2	
BOQ				13.0		12.4		8.0	
QSRatio									
85th Percentile Output:									
fB%				1.5		1.5		1.5	
BOQ				16.6		15.9		10.4	
QSRatio									
90th Percentile Output:									
fB%				1.6		1.6		1.7	
BOQ				18.0		17.2		11.4	
QSRatio									
95th Percentile Output:									
fB%				1.8		1.8		1.9	
BOQ				20.2		19.3		12.9	
QSRatio									
98th Percentile Output:									
fB%				2.1		2.1		2.3	
BOQ				23.5		22.6		15.5	
QSRatio									

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 NB Ramps

Inter.: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Volume				654		222		3328	910		2326	1140
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left	A				SB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right	A	A		
Green	16.9	0.0				47.4	27.7	0.0	
Yellow	3.6					4.7	4.7		
All Red	2.0					1.5	1.5		

Cycle Length: 110.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	741	4820	0.93	0.15	63.9	E		
							47.7	D
R	1583	1583	0.15	1.00	0.0+	A		
Northbound								
T	3750	5074	0.93	0.74	17.3	B	13.7	B
R	1583	1583	0.61	1.00	0.7	A		
Southbound								
T	5000	6765	0.49	0.74	5.9	A	4.7	A
R	1583	1583	0.76	1.00	2.2	A		

Intersection Delay = 13.5 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Jamboree at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				654		222		3328	910		2326	1140
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				172		58		876	239		612	300
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		3	0 1		0 3	1		0 4	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				688		234		3503	958		2448	1200
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right	A	A	
Green		16.9	0.0			47.4	27.7	0.0
Yellow		3.6				4.7	4.7	
All Red		2.0				1.5	1.5	

Cycle Length: 110.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				654		222		3328	910		2326	1140
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				688		234		3503	958		2448	1200
No. Lanes	0	0	0		3	0 1		0 3	1		0 4	1
Lane group				L		R		T	R		T	R
Adj flow				688		234		3503	958		2448	1200
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T	R		T	R	
So			1900		1900		1900	1900		1900	1900	
Lanes	0	0	3	0	1	0	3	1	0	4	1	
fW			1.000		1.000		1.000	1.000		1.000	1.000	
fHV			0.980		0.980		0.980	0.980		0.980	0.980	
fG			1.000		1.000		1.000	1.000		1.000	1.000	
fP			1.000		1.000		1.000	1.000		1.000	1.000	
fBB			1.000		1.000		1.000	1.000		1.000	1.000	
fA			1.000		1.000		1.000	1.000		1.000	1.000	
fLU			0.908		1.000		0.908	1.000		0.908	1.000	
fRT					0.850		1.000	0.850		1.000	0.850	
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000	1.000		1.000	1.000	
S			4820		1583		5074	1583		6765	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group		Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru									
Right									
Westbound									
Prot									
Perm									
Left	L		688	4820	#	0.14	0.15	741	0.93
Prot									
Perm									
Thru									
Right	R		234	1583		0.15	1.00	1583	0.15
Northbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru	T		3503	5074	#	0.69	0.74	3750	0.93
Right	R		958	1583		0.61	1.00	1583	0.61
Southbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru	T		2448	6765		0.36	0.74	5000	0.49
Right	R		1200	1583		0.76	1.00	1583	0.76

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.83
Total lost time per cycle, L = 11.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.93

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.93	0.15	46.0	1.000	741	0.44	18.0	0.0	63.9	E		
											47.7	D
R	0.15	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Northbound												
T	0.93	0.74	12.1	1.000	3750	0.45	5.2	0.0	17.3	B	13.7	B
R	0.61	1.00	0.0	0.950	1583	0.19	0.7	0.0	0.7	A		
Southbound												

T	0.49	0.74	5.9	1.000	5000	0.11	0.1	0.0	5.9	A	4.7	A
R	0.76	1.00	0.0	0.950	1583	0.31	2.2	0.0	2.2	A		

Intersection delay = 13.5 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 110.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 110.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	110.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	46.5	46.0	0.00	0.0	0.0	63.9
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Northbound								
	0.0						0.0	
T	0.0	0.00	14.3	12.1	0.00	0.0	0.0	17.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.7
Southbound								
	0.0						0.0	
T	0.0	0.00	14.3	5.9	0.00	0.0	0.0	5.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.2

Intersection Delay 13.5 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				252	234	1285	958	674	1200
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	3	0 1	0 3	1	0 4	1
SL				1769	1583	1862	1583	1862	1583
LnCapacity				272	1583	1376	1583	1376	1583
Flow Ratio				0.1	0.1	0.7	0.6	0.4	0.8
v/c Ratio				0.93	0.15	0.93	0.61	0.49	0.76
Grn Ratio				0.15	1.00	0.74	1.00	0.74	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00		1.00		1.00	
Q1				7.6		33.1		8.4	
kB				0.4	1.0	0.9	1.0	0.9	1.0
Q2				2.3	0.2	7.9	1.5	0.9	3.0
Q Average				9.9		40.9		9.3	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2		1.1		1.2	
BOQ				11.7		46.5		11.0	
QSRatio									
85th Percentile Output:									
fB%				1.5		1.4		1.5	
BOQ				15.0		56.4		14.2	
QSRatio									
90th Percentile Output:									
fB%				1.6		1.5		1.7	
BOQ				16.3		59.4		15.4	
QSRatio									
95th Percentile Output:									
fB%				1.8		1.6		1.9	
BOQ				18.3		63.9		17.3	
QSRatio									
98th Percentile Output:									
fB%				2.2		1.7		2.2	
BOQ				21.5		71.3		20.4	
QSRatio									

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 SB Ramps

Inter.: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Volume	810	0	1529					1370	547		2800	274
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	57.8	0.0				39.6	4.2	0.0
Yellow	3.5					4.7	4.7	
All Red	1.5					2.0	2.0	

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	853	1770	1.00	0.48	61.9	E		
LTR	897	1863	0.00	0.48	16.1	B	103.2	F
R	1350	2803	1.19	0.48	125.0	F		
Westbound								
Northbound								
T	2847	6765	0.51	0.42	25.7	C	18.4	B
R	1583	1583	0.36	1.00	0.1	A		
Southbound								
T	2847	6765	1.04	0.42	61.5	E	56.1	E
R	1583	1583	0.18	1.00	0.1	A		

Intersection Delay = 61.3 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Jamboree at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	810	0	1529					1370	547		2800	274
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	213	0	402					361	144		737	72
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L		LTR R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	853	0	1609					1442	576		2947	288
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	57.8	0.0			39.6	4.2	0.0	
Yellow	3.5				4.7	4.7		
All Red	1.5				2.0	2.0		

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	810	0	1529					1370	547		2800	274
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	853	0	1609					1442	576		2947	288
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
Lane group	L		LTR R					T	R		T	R
Adj flow	853	0	1609					1442	576		2947	288
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound							Northbound							Southbound						
LG	L		LTR	R											T	R						T	R				
So	1900		1900	1900											1900	1900						1900	1900				
Lanes	1		1	2		0		0		0		0			4	1		0				4	1				
fW	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fHV	0.980		0.980	0.980											0.980	0.980						0.980	0.980				
fG	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fP	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fBB	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fA	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fLU	1.000		1.000	0.885											0.908	1.000						0.908	1.000				
fRT			1.000	0.850											1.000	0.850						1.000	0.850				
fLT	0.950		1.000												1.000							1.000						
Sec.																												
fLpb	1.000		1.000												1.000							1.000						
fRpb			1.000	1.000											1.000	1.000						1.000	1.000				
S	1770		1863	2803											6765	1583						6765	1583				
Sec.																												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	853	1770		0.48	0.48	853	1.00
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.48	897	0.00
Right	R	1609	2803	#	0.57	0.48	1350	1.19
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1442	6765		0.21	0.42	2847	0.51
Right	R	576	1583		0.36	1.00	1583	0.36
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2947	6765	#	0.44	0.42	2847	1.04
Right	R	288	1583		0.18	1.00	1583	0.18

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.01
Total lost time per cycle, L = 11.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.12

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.00	0.48	31.1	1.000	853	0.50	30.8	0.0	61.9	E		
LTR	0.00	0.48	16.1	1.000	897	0.11	0.0	0.0	16.1	B	103.2	F
R	1.19	0.48	31.1	1.000	1350	0.50	93.9	0.0	125.0	F		
Westbound												
Northbound												
T	0.51	0.42	25.6	1.000	2847	0.12	0.1	0.0	25.7	C	18.4	B
R	0.36	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	1.04	0.42	34.7	1.000	2847	0.50	26.8	0.0	61.5	E	56.1	E
R	0.18	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 61.3 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	120.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	31.1	31.1	0.00	0.0	0.0	61.9

LTR	0.0	0.00	31.1	16.1	0.00	0.0	0.0	16.1
R	0.0	0.00	31.1	31.1	0.00	64.8	0.0	125.0
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	34.7	25.6	0.00	0.0	0.0	25.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	34.7	34.7	0.00	25.0	0.0	61.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 61.3 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	853	0	909				397	576		811	288	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	2	0	0	0	0	4	1	0	4	1
SL	1770	1863	1584				1862	1583		1862	1583	
LnCapacity	853	897	762				783	1583		783	1583	
Flow Ratio	0.5	0.0	0.6				0.2	0.4		0.4	0.2	
v/c Ratio	1.00	0.00	1.19				0.51	0.36		1.04	0.18	
Grn Ratio	0.48	0.48	0.48				0.42	1.00		0.42	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	28.4	0.0	30.3				9.7			27.0		
kB	0.7	0.8	0.7				0.7	1.1		0.7	1.1	
Q2	8.9	0.0	22.0				0.7	0.6		10.4	0.2	
Q Average	37.3	0.0	52.3				10.5			37.4		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.1				1.2			1.1		
BOQ	42.5	0.0	58.9				12.3			42.6		
QSRatio												
85th Percentile Output:												
fB%	1.4	1.6	1.4				1.5			1.4		
BOQ	51.8	0.0	70.7				15.8			51.9		
QSRatio												
90th Percentile Output:												
fB%	1.5	1.8	1.4				1.6			1.5		
BOQ	54.6	0.0	74.7				17.1			54.7		
QSRatio												
95th Percentile Output:												
fB%	1.6	2.1	1.5				1.8			1.6		
BOQ	58.8	0.0	80.1				19.2			59.0		
QSRatio												
98th Percentile Output:												
fB%	1.8	2.7	1.7				2.1			1.8		
BOQ	65.6	0.0	89.8				22.5			65.7		
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 SB Ramps

Inter.: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Volume	1496	0	668					2664	990		2512	640
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	57.8	0.0				39.6	4.2	0.0	
Yellow	3.5					4.7	4.7		
All Red	1.5					2.0	2.0		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	853	1770	1.85	0.48	416.5	F		
LTR	897	1863	0.00	0.48	16.1	B	294.7	F
R	1350	2803	0.52	0.48	21.9	C		
Westbound								
Northbound								
T	2847	6765	0.98	0.42	47.9	D	35.2	D
R	1583	1583	0.66	1.00	1.0	A		
Southbound								
T	2847	6765	0.93	0.42	39.2	D	31.3	C
R	1583	1583	0.43	1.00	0.2	A		

Intersection Delay = 96.4 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Jamboree at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	1496	0	668					2664	990		2512	640
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	394	0	176					701	261		661	168
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	1575	0	703					2804	1042		2644	674
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	57.8	0.0			39.6	4.2	0.0	
Yellow	3.5				4.7	4.7		
All Red	1.5				2.0	2.0		

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	1496	0	668					2664	990		2512	640
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	1575	0	703					2804	1042		2644	674
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	1575	0	703					2804	1042		2644	674
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound							Northbound							Southbound						
LG	L		LTR	R											T	R						T	R				
So	1900		1900	1900											1900	1900						1900	1900				
Lanes	1		1	2		0		0		0		0			4	1		0				4	1				
fW	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fHV	0.980		0.980	0.980											0.980	0.980						0.980	0.980				
fG	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fP	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fBB	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fA	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fLU	1.000		1.000	0.885											0.908	1.000						0.908	1.000				
fRT			1.000	0.850											1.000	0.850						1.000	0.850				
fLT	0.950		1.000												1.000							1.000						
Sec.																												
fLpb	1.000		1.000												1.000							1.000						
fRpb			1.000	1.000											1.000	1.000						1.000	1.000				
S	1770		1863	2803											6765	1583						6765	1583				
Sec.																												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	1575	1770	#	0.89	0.48	853	1.85
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.48	897	0.00
Right	R	703	2803		0.25	0.48	1350	0.52
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2804	6765	#	0.41	0.42	2847	0.98
Right	R	1042	1583		0.66	1.00	1583	0.66
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2644	6765		0.39	0.42	2847	0.93
Right	R	674	1583		0.43	1.00	1583	0.43

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.30
Total lost time per cycle, L = 11.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.45

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.85	0.48	31.1	1.000	853	0.50	385.4	0.0	416.5	F		
LTR	0.00	0.48	16.1	1.000	897	0.11	0.0	0.0	16.1	B	294.7	F
R	0.52	0.48	21.5	1.000	1350	0.13	0.4	0.0	21.9	C		
Westbound												
Northbound												
T	0.98	0.42	34.4	1.000	2847	0.49	13.5	0.0	47.9	D	35.2	D
R	0.66	1.00	0.0	0.950	1583	0.23	1.0	0.0	1.0	A		
Southbound												

T	0.93	0.42	33.0	1.000	2847	0.44	6.1	0.0	39.2	D	31.3 C
R	0.43	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A	

Intersection delay = 96.4 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	120.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	120.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	120.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	31.1	31.1	0.00	180.5	0.0	416.5

LTR	0.0	0.00	31.1	16.1	0.00	0.0	0.0	16.1
R	0.0	0.00	31.1	21.5	0.00	0.0	0.0	21.9
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	34.7	34.4	0.00	0.0	0.0	47.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.0
Southbound								
	0.0						0.0	
T	0.0	0.00	34.7	33.0	0.00	0.0	0.0	39.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 96.4 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	1575	0	397				772	1042		727	674	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	2	0	0	0	4	1	0	4	1	
SL	1770	1863	1584				1862	1583		1862	1583	
LnCapacity	853	897	762				783	1583		783	1583	
Flow Ratio	0.9	0.0	0.3				0.4	0.7		0.4	0.4	
v/c Ratio	1.85	0.00	0.52				0.99	0.66		0.93	0.43	
Grn Ratio	0.48	0.48	0.48				0.42	1.00		0.42	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	52.5	0.0	9.2				25.5			23.0		
kB	0.7	0.8	0.7				0.7	1.1		0.7	1.1	
Q2	91.8	0.0	0.7				7.6	2.0		5.3	0.8	
Q Average	144.3		0.0	9.9				33.1			28.3	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.2				1.1			1.1		
BOQ	159	0.0	11.7				37.8			32.5		
QSRatio												
85th Percentile Output:												
fB%	1.3	1.6	1.5				1.4			1.4		
BOQ	188	0.0	15.0				46.3			40.1		
QSRatio												
90th Percentile Output:												
fB%	1.4	1.8	1.6				1.5			1.5		
BOQ	202	0.0	16.3				48.8			42.4		
QSRatio												
95th Percentile Output:												
fB%	1.5	2.1	1.8				1.6			1.6		
BOQ	217	0.0	18.3				52.8			46.0		
QSRatio												
98th Percentile Output:												
fB%	1.7	2.7	2.2				1.8			1.8		
BOQ	245	0.0	21.5				58.8			51.3		
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency:
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Volume				902		679		2061	298	212	958	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	20.4	0.0			4.9	6.8	9.5	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1079	3437	0.88	0.31	29.7	C		
							28.3	C
R	880	2803	0.81	0.31	26.4	C		
Northbound								
T	2352	6765	0.92	0.35	27.0	C	25.6	C
R	975	2803	0.32	0.35	15.8	B		
Southbound								
L	259	3437	0.86	0.08	54.0	D		
T	3403	6765	0.30	0.50	9.5	A	17.5	B

Intersection Delay = 24.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.:
Date Performed: 11/17/09
Analysis Time Period: AM
Intersection: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2015
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				902		679		2061	298	212	958	
% Heavy Veh				2		2		2	2	2	2	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol				237		179		542	78	56	252	
Hi Ln Vol												
% Grade				0				0			0	
Ideal Sat				1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			
Adj Flow				949		715		2169	314	223	1008	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000	0.000		
Peds Bikes	0			0			0					
Buses				0		0		0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type				3		3		3	3	3	3	
Unit Ext.				3.0		3.0		3.0	3.0	3.0	3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g				2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	20.4	0.0			4.9	6.8	9.5	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				902		679		2061	298	212	958	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow				949		715		2169	314	223	1008	
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
Lane group				L		R		T	R	L	T	
Adj flow				949		715		2169	314	223	1008	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000	0.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		L	T	
So				1900		1900	1900	1900		1900	1900	
Lanes	0	0	0	2	0	2	0 4	2		2	4	0
fW				1.000		1.000	1.000	1.000		1.000	1.000	
fHV				0.980		0.980	0.980	0.980		0.980	0.980	
fG				1.000		1.000	1.000	1.000		1.000	1.000	
fP				1.000		1.000	1.000	1.000		1.000	1.000	
fBB				1.000		1.000	1.000	1.000		1.000	1.000	
fA				1.000		1.000	1.000	1.000		1.000	1.000	
fLU				0.971		0.885	0.908	0.885		0.971	0.908	
fRT						0.850	1.000	0.850			1.000	
fLT				0.950			1.000			0.950	1.000	
Sec.												
fLpb				1.000			1.000			1.000	1.000	
fRpb						1.000	1.000	1.000			1.000	
S				3437		2803	6765	2803		3437	6765	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group		Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru									
Right									
Westbound									
Prot									
Perm									
Left	L		949	3437	#	0.28	0.31	1079	0.88
Prot									
Perm									
Thru									
Right	R		715	2803		0.26	0.31	880	0.81
Northbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru	T		2169	6765	#	0.32	0.35	2352	0.92
Right	R		314	2803		0.11	0.35	975	0.32
Southbound									
Prot									
Perm									
Left	L		223	3437	#	0.06	0.08	259	0.86
Prot									
Perm									
Thru	T		1008	6765		0.15	0.50	3403	0.30
Right									

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.66
Total lost time per cycle, L = 17.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.90

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.88	0.31	21.1	1.000	1079	0.41	8.5	0.0	29.7	C		
											28.3	C
R	0.81	0.31	20.5	1.000	880	0.35	5.9	0.0	26.4	C		
Northbound												
T	0.92	0.35	20.4	1.000	2352	0.44	6.7	0.0	27.0	C	25.6	C
R	0.32	0.35	15.6	1.000	975	0.11	0.2	0.0	15.8	B		
Southbound												
L	0.86	0.08	29.7	1.000	259	0.39	24.3	0.0	54.0	D		

T 0.30 0.50 9.4 1.000 3403 0.11 0.0 0.0 9.5 A 17.5 B

Intersection delay = 24.6 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	22.3	21.1	0.00	0.0	0.0	29.7
	0.0						0.0	
R	0.0	0.00	22.3	20.5	0.00	0.0	0.0	26.4
Northbound								
	0.0						0.0	
T	0.0	0.00	21.2	20.4	0.00	0.0	0.0	27.0
R	0.0	0.00	21.2	15.6	0.00	0.0	0.0	15.8
Southbound								
L	0.0	0.00	30.0	29.7	0.00	0.0	0.0	54.0
T	0.0	0.00	16.1	9.4	0.00	0.0	0.0	9.5
	0.0						0.0	

Intersection Delay 24.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup				L	R	T	R	L	T	
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate				488	403	597	177	114	277	
So				1900	1900	1900	1900	1900	1900	
No.Lanes	0	0	0	2	0 2	0 4	2	2	4	0
SL				1770	1584	1862	1584	1770	1862	
LnCapacity				555	497	647	550	133	936	
Flow Ratio				0.3	0.3	0.3	0.1	0.1	0.1	
v/c Ratio				0.88	0.81	0.92	0.32	0.86	0.30	
Grn Ratio				0.31	0.31	0.35	0.35	0.08	0.50	
I Factor				1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00	1.00	
Q1				8.4	6.7	10.4	2.3	2.0	2.9	
kB				0.4	0.4	0.4	0.4	0.2	0.5	
Q2				2.3	1.4	3.4	0.2	0.8	0.2	
Q Average				10.6	8.1	13.7	2.5	2.8	3.1	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage				0	0	0	0	0	0	
Q S Ratio										
70th Percentile Output:										
fB%				1.2	1.2	1.2	1.2	1.2	1.2	
BOQ				12.5	9.6	16.1	3.0	3.3	3.8	
QSRatio										
85th Percentile Output:										
fB%				1.5	1.5	1.5	1.6	1.6	1.6	
BOQ				16.1	12.4	20.5	4.0	4.4	4.9	
QSRatio										
90th Percentile Output:										
fB%				1.6	1.7	1.6	1.8	1.7	1.7	
BOQ				17.4	13.5	22.0	4.4	4.9	5.5	
QSRatio										
95th Percentile Output:										
fB%				1.8	1.9	1.8	2.0	2.0	2.0	
BOQ				19.5	15.3	24.5	5.1	5.6	6.3	
QSRatio										
98th Percentile Output:										
fB%				2.1	2.2	2.0	2.5	2.5	2.5	
BOQ				22.8	18.2	28.1	6.4	7.0	7.8	
QSRatio										

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Volume				574		293		1807	947	583	1486	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	15.6	0.0			17.2	5.8	23.0	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 85.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	631	3437	0.96	0.18	59.9	E		
							51.1	D
R	514	2803	0.60	0.18	33.8	C		
Northbound								
T	2794	6765	0.68	0.41	21.1	C	24.0	C
R	1157	2803	0.86	0.41	29.6	C		
Southbound								
L	695	3437	0.88	0.20	45.8	D		
T	4576	6765	0.34	0.68	5.8	A	17.1	B

Intersection Delay = 25.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Macarthur at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				574		293		1807	947	583	1486	
% Heavy Veh				2		2		2	2	2	2	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol				151		77		476	249	153	391	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			
Adj Flow				604		308		1902	997	614	1564	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	
Peds Bikes	0			0			0					
Buses				0		0		0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type				3		3		3	3	3	3	
Unit Ext.				3.0		3.0		3.0	3.0	3.0	3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g				2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
WB Left		A			SB Left	A		
Thru					Thru	A	A	A
Right		A			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		15.6	0.0			17.2	5.8	23.0	0.0
Yellow		3.6				3.2	4.3	4.3	
All Red		2.0				2.0	2.0	2.0	

Cycle Length: 85.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				574		293		1807	947	583	1486	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow				604		308		1902	997	614	1564	
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
Lane group				L		R		T	R	L	T	
Adj flow				604		308		1902	997	614	1564	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R	L	T		
So				1900		1900	1900	1900	1900	1900		
Lanes	0	0	0	2	0	2	0	4	2	2	4	0
fW				1.000		1.000		1.000	1.000	1.000	1.000	
fHV				0.980		0.980		0.980	0.980	0.980	0.980	
fG				1.000		1.000		1.000	1.000	1.000	1.000	
fP				1.000		1.000		1.000	1.000	1.000	1.000	
fBB				1.000		1.000		1.000	1.000	1.000	1.000	
fA				1.000		1.000		1.000	1.000	1.000	1.000	
fLU				0.971		0.885		0.908	0.885	0.971	0.908	
fRT						0.850		1.000	0.850		1.000	
fLT				0.950				1.000		0.950	1.000	
Sec.												
fLpb				1.000				1.000		1.000	1.000	
fRpb						1.000		1.000	1.000		1.000	
S				3437		2803		6765	2803	3437	6765	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	604	3437	#	0.18	0.18	631	0.96
Prot								
Perm								
Thru								
Right	R	308	2803		0.11	0.18	514	0.60
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1902	6765		0.28	0.41	2794	0.68
Right	R	997	2803	#	0.36	0.41	1157	0.86
Southbound								
Prot								
Perm								
Left	L	614	3437	#	0.18	0.20	695	0.88
Prot								
Perm								
Thru	T	1564	6765		0.23	0.68	4576	0.34
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.71
Total lost time per cycle, L = 17.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.89

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.96	0.18	34.4	1.000	631	0.47	25.6	0.0	59.9	E		
											51.1	D
R	0.60	0.18	31.8	1.000	514	0.19	1.9	0.0	33.8	C		
Northbound												
T	0.68	0.41	20.4	1.000	2794	0.25	0.7	0.0	21.1	C	24.0	C
R	0.86	0.41	22.7	1.000	1157	0.39	6.8	0.0	29.6	C		
Southbound												
L	0.88	0.20	32.9	1.000	695	0.41	12.9	0.0	45.8	D		

T	0.34	0.68	5.8	1.000	4576	0.11	0.0	0.0	5.8	A	17.1	B

Intersection delay = 25.6 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 85.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 85.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	85.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	34.7	34.4	0.00	0.0	0.0	59.9
	0.0						0.0	
R	0.0	0.00	34.7	31.8	0.00	0.0	0.0	33.8
Northbound								
	0.0						0.0	
T	0.0	0.00	25.0	20.4	0.00	0.0	0.0	21.1
R	0.0	0.00	25.0	22.7	0.00	0.0	0.0	29.6
Southbound								
L	0.0	0.00	33.9	32.9	0.00	0.0	0.0	45.8
T	0.0	0.00	13.8	5.8	0.00	0.0	0.0	5.8
	0.0						0.0	

Intersection Delay 25.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L		R	T		R	L	T	
Init Queue				0.0		0.0	0.0		0.0	0.0	0.0	
Flow Rate				311		174	523		563	316	430	
So				1900		1900	1900		1900	1900	1900	
No.Lanes	0	0	0	2	0	2	0	4	2	2	4	0
SL				1770		1584	1862		1584	1770	1862	
LnCapacity				324		290	769		653	357	1259	
Flow Ratio				0.2		0.1	0.3		0.4	0.2	0.2	
v/c Ratio				0.96		0.60	0.68		0.86	0.89	0.34	
Grn Ratio				0.18		0.18	0.41		0.41	0.20	0.68	
I Factor				1.000			1.000			1.000		
AT or PVG				3		3	3		3	3	3	
Pltn Ratio				1.00		1.00	1.00		1.00	1.00	1.00	
PF2				1.00		1.00	1.00		1.00	1.00	1.00	
Q1				7.3		3.8	10.1		12.1	7.2	4.3	
kB				0.3		0.3	0.6		0.5	0.4	0.8	
Q2				2.9		0.5	1.2		2.6	2.0	0.4	
Q Average				10.2		4.2	11.2		14.7	9.2	4.7	
Q Spacing				25.0		25.0	25.0		25.0	25.0	25.0	
Q Storage				0		0	0		0	0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.2		1.2	1.2		1.2	1.2	1.2	
BOQ				12.0		5.0	13.2		17.2	10.9	5.5	
QSRatio												
85th Percentile Output:												
fB%				1.5		1.6	1.5		1.5	1.5	1.6	
BOQ				15.4		6.6	16.9		21.9	14.1	7.3	
QSRatio												
90th Percentile Output:												
fB%				1.6		1.7	1.6		1.6	1.7	1.7	
BOQ				16.7		7.3	18.3		23.5	15.3	8.0	
QSRatio												
95th Percentile Output:												
fB%				1.8		2.0	1.8		1.8	1.9	2.0	
BOQ				18.8		8.4	20.5		26.0	17.2	9.2	
QSRatio												
98th Percentile Output:												
fB%				2.2		2.4	2.1		2.0	2.2	2.4	
BOQ				22.0		10.2	23.9		29.8	20.3	11.2	
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 5/5/2009
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				1066	299	1096		1204	373	187	1154	491
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
WB Left	A				SB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right	A	A	A	
Green	24.6	0.0				4.7	9.2	4.8	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1301	3437	0.86	0.38	24.8	C		
T	705	1863	0.45	0.38	15.6	B	13.4	B
R	1583	1583	0.73	1.00	1.7	A		
Northbound								
T	2092	6765	0.61	0.31	19.6	B	22.0	C
R	490	1583	0.80	0.31	29.9	C		
Southbound								
L	249	3437	0.79	0.07	45.5	D		
T	2997	6765	0.41	0.44	12.4	B	17.6	B
R	701	1583	0.74	0.44	19.1	B		

Intersection Delay = 17.0 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	5/5/2009
Analysis Time Period:	AM
Intersection:	Macarthur at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1066	299	1096		1204	373	187	1154	491
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				281	79	288		317	98	49	304	129
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L		T	R		T	R	L		T	R
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0	
Adj Flow				1122	315	1154		1267	393	197	1215	517
%InSharedLn												
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0	0	0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	24.6	0.0				4.7	9.2	4.8	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1066	299	1096		1204	373	187	1154	491
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				1122	315	1154		1267	393	197	1215	517
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
Lane group				L		T	R		T	R	L		T	R
Adj flow				1122	315	1154		1267	393	197	1215	517
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	1122	3437		0.33	0.38	1301	0.86
Prot								
Perm								
Thru	T	315	1863		0.17	0.38	705	0.45
Right	R	1154	1583	#	0.73	1.00	1583	0.73
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1267	6765		0.19	0.31	2092	0.61
Right	R	393	1583		0.25	0.31	490	0.80
Southbound								
Prot								
Perm								
Left	L	197	3437		0.06	0.07	249	0.79
Prot								
Perm								
Thru	T	1215	6765		0.18	0.44	2997	0.41
Right	R	517	1583		0.33	0.44	701	0.74

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.73
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.73

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.86	0.38	18.6	1.000	1301	0.39	6.2	0.0	24.8	C		
T	0.45	0.38	15.1	1.000	705	0.11	0.5	0.0	15.6	B	13.4	B
R	0.73	1.00	0.0	0.950	1583	0.29	1.7	0.0	1.7	A		
Northbound												
T	0.61	0.31	19.1	1.000	2092	0.19	0.5	0.0	19.6	B	22.0	C
R	0.80	0.31	20.6	1.000	490	0.35	9.3	0.0	29.9	C		
Southbound												
L	0.79	0.07	29.7	1.000	249	0.34	15.8	0.0	45.5	D		

T	0.41	0.44	12.3	1.000	2997	0.11	0.1	0.0	12.4	B	17.6 B
R	0.74	0.44	15.0	1.000	701	0.30	4.1	0.0	19.1	B	

Intersection delay = 17.0 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	65.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	65.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	20.2	18.6	0.00	0.0	0.0	24.8
T	0.0	0.00	20.2	15.1	0.00	0.0	0.0	15.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.7
Northbound								
	0.0						0.0	
T	0.0	0.00	22.4	19.1	0.00	0.0	0.0	19.6
R	0.0	0.00	22.4	20.6	0.00	0.0	0.0	29.9
Southbound								
L	0.0	0.00	30.1	29.7	0.00	0.0	0.0	45.5
T	0.0	0.00	18.1	12.3	0.00	0.0	0.0	12.4
R	0.0	0.00	18.1	15.0	0.00	0.0	0.0	19.1

Intersection Delay 17.0 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound		
LaneGroup				L	T	R	T	R	L	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				577	315	1154	348	393	101	334	517
So				1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	1	1	4	1	2	4	1
SL				1770	1863	1583	1862	1583	1770	1862	1583
LnCapacity				669	705	1583	575	490	128	825	701
Flow Ratio				0.3	0.2	0.7	0.2	0.2	0.1	0.2	0.3
v/c Ratio				0.86	0.45	0.73	0.61	0.80	0.79	0.40	0.74
Grn Ratio				0.38	0.38	1.00	0.31	0.31	0.07	0.44	0.44
I Factor					1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1				9.6	4.3		5.3	6.5	1.8	4.1	7.7
kB				0.4	0.5	0.7	0.4	0.4	0.2	0.5	0.5
Q2				2.3	0.4	1.9	0.6	1.3	0.5	0.3	1.2
Q Average				11.9	4.6		6.0	7.9	2.3	4.4	8.9
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0	0
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2		1.2	1.2	1.2	1.2	1.2
BOQ				14.0	5.5		7.1	9.3	2.8	5.3	10.6
QSRatio											
85th Percentile Output:											
fB%				1.5	1.6		1.5	1.5	1.6	1.6	1.5
BOQ				17.9	7.2		9.2	12.0	3.7	6.9	13.6
QSRatio											
90th Percentile Output:											
fB%				1.6	1.7		1.7	1.7	1.8	1.7	1.7
BOQ				19.3	7.9		10.1	13.1	4.1	7.6	14.8
QSRatio											
95th Percentile Output:											
fB%				1.8	2.0		1.9	1.9	2.0	2.0	1.9
BOQ				21.6	9.1		11.5	14.8	4.7	8.7	16.7
QSRatio											
98th Percentile Output:											
fB%				2.1	2.4		2.3	2.2	2.5	2.4	2.2
BOQ				25.1	11.1		13.9	17.7	5.9	10.7	19.7
QSRatio											

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				633	301	637		2063	672	588	1167	369
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	15.6	0.0				8.4	8.3	6.0	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	894	3437	0.74	0.26	23.8	C		
T	484	1863	0.65	0.26	23.0	C	14.1	B
R	1583	1583	0.42	1.00	0.2	A		
Northbound								
T	2300	6765	0.94	0.34	28.2	C	64.0	E
R	538	1583	1.31	0.34	174.0	F		
Southbound								
L	481	3437	1.29	0.14	169.9	F		
T	3698	6765	0.33	0.55	7.6	A	52.7	D
R	865	1583	0.45	0.55	8.5	A		

Intersection Delay = 48.1 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Macarthur at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				633	301	637		2063	672	588	1167	369
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				167	79	168		543	177	155	307	97
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L		T	R		T	R	L		T	R
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0	
Adj Flow				666	317	671		2172	707	619	1228	388
%InSharedLn												
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0	0	0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	15.6	0.0				8.4	8.3	6.0	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				633	301	637		2063	672	588	1167	369
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				666	317	671		2172	707	619	1228	388
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
Lane group				L		T	R		T	R	L		T	R
Adj flow				666	317	671		2172	707	619	1228	388
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	666	3437	#	0.19	0.26	894	0.74
Prot								
Perm								
Thru	T	317	1863		0.17	0.26	484	0.65
Right	R	671	1583		0.42	1.00	1583	0.42
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2172	6765		0.32	0.34	2300	0.94
Right	R	707	1583	#	0.45	0.34	538	1.31
Southbound								
Prot								
Perm								
Left	L	619	3437	#	0.18	0.14	481	1.29
Prot								
Perm								
Thru	T	1228	6765		0.18	0.55	3698	0.33
Right	R	388	1583		0.25	0.55	865	0.45

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.82
Total lost time per cycle, L = 15.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.11

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.74	0.26	20.4	1.000	894	0.30	3.4	0.0	23.8	C		
T	0.65	0.26	19.8	1.000	484	0.23	3.2	0.0	23.0	C	14.1	B
R	0.42	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Northbound												
T	0.94	0.34	19.2	1.000	2300	0.46	8.9	0.0	28.2	C	64.0	E
R	1.31	0.34	19.8	1.000	538	0.50	154.2	0.0	174.0	F		
Southbound												
L	1.29	0.14	25.8	1.000	481	0.50	144.1	0.0	169.9	F		

T	0.33	0.55	7.5	1.000	3698	0.11	0.1	0.0	7.6	A	52.7 D
R	0.45	0.55	8.2	1.000	865	0.11	0.4	0.0	8.5	A	

Intersection delay = 48.1 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	22.2	20.4	0.00	0.0	0.0	23.8
T	0.0	0.00	22.2	19.8	0.00	0.0	0.0	23.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Northbound								
	0.0						0.0	
T	0.0	0.00	19.8	19.2	0.00	0.0	0.0	28.2
R	0.0	0.00	19.8	19.8	0.00	42.2	0.0	174.0
Southbound								
L	0.0	0.00	25.8	25.8	0.00	34.5	0.0	169.9
T	0.0	0.00	13.6	7.5	0.00	0.0	0.0	7.6
R	0.0	0.00	13.6	8.2	0.00	0.0	0.0	8.5

Intersection Delay 48.1 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound		
LaneGroup				L	T	R	T	R	L	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				342	317	671	598	707	318	338	388
So				1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	1	1	4	1	2	4	1
SL				1770	1863	1583	1862	1583	1770	1862	1583
LnCapacity				460	484	1583	633	538	247	1018	865
Flow Ratio				0.2	0.2	0.4	0.3	0.4	0.2	0.2	0.2
v/c Ratio				0.74	0.65	0.42	0.94	1.31	1.29	0.33	0.45
Grn Ratio				0.26	0.26	1.00	0.34	0.34	0.14	0.55	0.55
I Factor					1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1				5.2	4.7		9.7	11.8	5.3	3.1	3.9
kB				0.3	0.4	0.7	0.4	0.4	0.2	0.5	0.5
Q2				0.9	0.6	0.5	3.8	22.6	9.8	0.3	0.4
Q Average				6.2	5.4		13.5	34.4	15.1	3.4	4.3
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0	0
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2		1.2	1.1	1.2	1.2	1.2
BOQ				7.3	6.4		15.8	39.3	17.7	4.0	5.1
QSRatio											
85th Percentile Output:											
fB%				1.5	1.6		1.5	1.4	1.5	1.6	1.6
BOQ				9.5	8.3		20.1	48.0	22.4	5.3	6.7
QSRatio											
90th Percentile Output:											
fB%				1.7	1.7		1.6	1.5	1.6	1.7	1.7
BOQ				10.4	9.1		21.6	50.6	24.0	5.9	7.4
QSRatio											
95th Percentile Output:											
fB%				1.9	1.9		1.8	1.6	1.8	2.0	2.0
BOQ				11.9	10.4		24.0	54.6	26.6	6.8	8.5
QSRatio											
98th Percentile Output:											
fB%				2.3	2.4		2.1	1.8	2.0	2.5	2.4
BOQ				14.3	12.7		27.7	60.9	30.4	8.4	10.4
QSRatio											

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 NB Ramps

Inter.: Baker at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
LGConfig	L	T			T	R		LTR				
Volume	544	1217			253	158	319	313	338			
Lane Width	12.0	12.0			12.0	12.0		12.0				
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	30.6	5.8	5.0	0.0		29.9	0.0		
Yellow	3.2	4.0	4.0			3.5			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	602	1770	0.95	0.34	54.2	D		
T	1994	3547	0.64	0.56	14.2	B	26.6	C
Westbound								
T	623	3547	0.43	0.18	33.5	C	35.1	D
R	278	1583	0.60	0.18	37.7	D		
Northbound								
LTR	1099	3307	0.93	0.33	42.4	D	42.4	D
Southbound								

Intersection Delay = 32.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Baker at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 NB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	544	1217			253	158	319	313	338			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	143	320			67	42	84	82	89			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900		1900				
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
LGConfig	L	T			T	R		LTR				
Lane Width	12.0	12.0			12.0	12.0		12.0				
RTOR Vol					0			0				
Adj Flow	573	1281			266	166		1021				
%InSharedLn												
Prop LTs		0.000			0.000			0.329				
Prop RTs		0.000			0.000	1.000		0.349				
Peds Bikes					0			0			0	
Buses	0	0			0	0		0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0		0.0				
Arriv. Type	3	3			3	3		3				
Unit Ext.	3.0	3.0			3.0	3.0		3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0		2.0				
Ext of g	2.0	2.0			2.0	2.0		2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	30.6	5.8	5.0	0.0		29.9	0.0	
Yellow	3.2	4.0	4.0			3.5		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	544	1217			253	158	319	313	338			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	573	1281			266	166	336	329	356			
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
Lane group	L	T			T	R		LTR				
Adj flow	573	1281			266	166		1021				
Prop LTs		0.000			0.000			0.329				
Prop RTs		0.000			0.000	1.000		0.349				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound			Northbound			Southbound			
LG	L	T			T	R		LTR						
So	1900	1900			1900	1900		1900						
Lanes	1	2	0	0	2	1	0	2	0	0	0	0		
fW	1.000	1.000			1.000	1.000		1.000						
fHV	0.980	0.980			0.980	0.980		0.980						
fG	1.000	1.000			1.000	1.000		1.000						
fP	1.000	1.000			1.000	1.000		1.000						
fBB	1.000	1.000			1.000	1.000		1.000						
fA	1.000	1.000			1.000	1.000		1.000						
fLU	1.000	0.952			0.952	1.000		0.952						
fRT		1.000			1.000	0.850		0.948						
fLT	0.950	1.000			1.000			0.984						
Sec.														
fLpb	1.000	1.000			1.000			1.000						
fRpb		1.000			1.000	1.000		1.000						
S	1770	3547			3547	1583		3307						
Sec.														

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	573	1770	#	0.32	0.34	602	0.95
Prot								
Perm								
Thru	T	1281	3547		0.36	0.56	1994	0.64
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	266	3547		0.07	0.18	623	0.43
Right	R	166	1583	#	0.10	0.18	278	0.60
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	1021	3307	#	0.31	0.33	1099	0.93
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.74
Total lost time per cycle, L = 13.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.87

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.95	0.34	29.0	1.000	602	0.46	25.2	0.0	54.2	D		
T	0.64	0.56	13.5	1.000	1994	0.22	0.7	0.0	14.2	B	26.6	C
Westbound												
T	0.43	0.18	33.1	1.000	623	0.11	0.5	0.0	33.5	C	35.1	D
R	0.60	0.18	34.2	1.000	278	0.19	3.5	0.0	37.7	D		
Northbound												
LTR	0.93	0.33	29.0	1.000	1099	0.44	13.4	0.0	42.4	D	42.4	D
Southbound												

Intersection delay = 32.6 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.329	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	90.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	29.7	29.0	0.00	0.0	0.0	54.2

T	0.0	0.00	19.7	13.5	0.00	0.0	0.0	14.2
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	37.1	33.1	0.00	0.0	0.0	33.5
R	0.0	0.00	37.1	34.2	0.00	0.0	0.0	37.7
Northbound								
	0.0						0.0	
LTR	0.0	0.00	30.0	29.0	0.00	0.0	0.0	42.4
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 32.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound			Southbound		
LaneGroup	L	T		T	R	LTR					
Init Queue	0.0	0.0		0.0	0.0	0.0					
Flow Rate	573	672		139	166	536					
So	1900	1900		1900	1900	1900					
No.Lanes	1	2	0	0	2	1	0	2	0	0	0	0
SL	1770	1862		1862	1583	1736					
LnCapacity	602	1047		327	278	577					
Flow Ratio	0.3	0.4		0.1	0.1	0.3					
v/c Ratio	0.95	0.64		0.43	0.60	0.93					
Grn Ratio	0.34	0.56		0.18	0.18	0.33					
I Factor		1.000		1.000		1.000					
AT or PVG	3	3		3	3	3					
Pltn Ratio	1.00	1.00		1.00	1.00	1.00					
PF2	1.00	1.00		1.00	1.00	1.00					
Q1	14.0	11.5		3.1	3.8	12.9					
kB	0.5	0.7		0.4	0.3	0.5					
Q2	4.5	1.2		0.3	0.5	3.7					
Q Average	18.5	12.7		3.4	4.3	16.7					
Q Spacing	25.0	25.0		25.0	25.0	25.0					
Q Storage	0	0		0	0	0					
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2		1.2	1.2	1.2					
BOQ	21.5	14.9		4.0	5.1	19.5					
QSRatio											
85th Percentile Output:											
fB%	1.5	1.5		1.6	1.6	1.5					
BOQ	27.0	19.1		5.3	6.7	24.6					
QSRatio											
90th Percentile Output:											
fB%	1.6	1.6		1.7	1.7	1.6					
BOQ	28.8	20.5		5.8	7.4	26.3					
QSRatio											
95th Percentile Output:											
fB%	1.7	1.8		2.0	2.0	1.7					
BOQ	31.7	22.9		6.7	8.4	29.0					
QSRatio											
98th Percentile Output:											
fB%	1.9	2.1		2.5	2.4	2.0					
BOQ	35.9	26.4		8.3	10.4	33.0					
QSRatio											

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 NB Ramps

Inter.: Baker at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
LGConfig	L	T			T	R		LTR				
Volume	272	458			1003	396	355	378	337			
Lane Width	12.0	12.0			12.0	12.0		12.0				
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	13.1	16.4	9.0	0.0		32.8	0.0		
Yellow	3.2	4.0	4.0			3.5			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	258	1770	1.11	0.15	126.7	F		
T	1880	3547	0.26	0.53	11.6	B	54.5	D
Westbound								
T	1198	3547	0.88	0.34	36.0	D	35.5	D
R	535	1583	0.78	0.34	34.1	C		
Northbound								
LTR	1211	3324	0.93	0.36	40.2	D	40.2	D
Southbound								

Intersection Delay = 41.4 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Baker at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 NB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	272	458			1003	396	355	378	337			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	72	121			264	104	93	99	89			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900		1900				
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
LGConfig	L	T			T	R		LTR				
Lane Width	12.0	12.0			12.0	12.0		12.0				
RTOR Vol					0			0				
Adj Flow	286	482			1056	417		1127				
%InSharedLn												
Prop LTs		0.000			0.000			0.332				
Prop RTs		0.000			0.000	1.000		0.315				
Peds Bikes					0			0			0	
Buses	0	0			0	0		0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0		0.0				
Arriv. Type	3	3			3	3		3				
Unit Ext.	3.0	3.0			3.0	3.0		3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0		2.0				
Ext of g	2.0	2.0			2.0	2.0		2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	13.1	16.4	9.0	0.0		32.8	0.0	
Yellow	3.2	4.0	4.0			3.5		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	272	458			1003	396	355	378	337			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	286	482			1056	417	374	398	355			
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
Lane group	L	T			T	R		LTR				
Adj flow	286	482			1056	417		1127				
Prop LTs		0.000			0.000			0.332				
Prop RTs		0.000			0.000	1.000		0.315				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound			Northbound			Southbound			
LG	L	T			T	R		LTR						
So	1900	1900			1900	1900		1900						
Lanes	1	2	0	0	2	1	0	2	0	0	0	0		
fW	1.000	1.000			1.000	1.000		1.000						
fHV	0.980	0.980			0.980	0.980		0.980						
fG	1.000	1.000			1.000	1.000		1.000						
fP	1.000	1.000			1.000	1.000		1.000						
fBB	1.000	1.000			1.000	1.000		1.000						
fA	1.000	1.000			1.000	1.000		1.000						
fLU	1.000	0.952			0.952	1.000		0.952						
fRT		1.000			1.000	0.850		0.953						
fLT	0.950	1.000			1.000			0.984						
Sec.														
fLpb	1.000	1.000			1.000			1.000						
fRpb		1.000			1.000	1.000		1.000						
S	1770	3547			3547	1583		3324						
Sec.														

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	286	1770	#	0.16	0.15	258	1.11
Prot								
Perm								
Thru	T	482	3547		0.14	0.53	1880	0.26
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1056	3547	#	0.30	0.34	1198	0.88
Right	R	417	1583		0.26	0.34	535	0.78
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	1127	3324	#	0.34	0.36	1211	0.93
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.80
Total lost time per cycle, L = 13.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.94

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.11	0.15	38.5	1.000	258	0.50	88.3	0.0	126.7	F		
T	0.26	0.53	11.5	1.000	1880	0.11	0.1	0.0	11.6	B	54.5	D
Westbound												
T	0.88	0.34	28.1	1.000	1198	0.41	7.9	0.0	36.0	D	35.5	D
R	0.78	0.34	26.8	1.000	535	0.33	7.3	0.0	34.1	C		
Northbound												
LTR	0.93	0.36	27.5	1.000	1211	0.45	12.7	0.0	40.2	D	40.2	D
Southbound												

Intersection delay = 41.4 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.332	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	90.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	38.5	38.5	0.00	7.0	0.0	126.7

T	0.0	0.00	21.1	11.5	0.00	0.0	0.0	11.6
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	29.8	28.1	0.00	0.0	0.0	36.0
R	0.0	0.00	29.8	26.8	0.00	0.0	0.0	34.1
Northbound								
	0.0						0.0	
LTR	0.0	0.00	28.6	27.5	0.00	0.0	0.0	40.2
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 41.4 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound			Southbound		
LaneGroup	L	T		T	R	LTR					
Init Queue	0.0	0.0		0.0	0.0	0.0					
Flow Rate	286	253		554	417	591					
So	1900	1900		1900	1900	1900					
No.Lanes	1	2	0	0 2	1	0	2	0	0	0	0
SL	1770	1862		1862	1583	1745					
LnCapacity	258	987		629	535	636					
Flow Ratio	0.2	0.1		0.3	0.3	0.3					
v/c Ratio	1.11	0.26		0.88	0.78	0.93					
Grn Ratio	0.15	0.53		0.34	0.34	0.36					
I Factor		1.000		1.000		1.000					
AT or PVG	3	3		3	3	3					
Pltn Ratio	1.00	1.00		1.00	1.00	1.00					
PF2	1.00	1.00		1.00	1.00	1.00					
Q1	7.2	3.4		13.1	9.4	14.2					
kB	0.3	0.7		0.5	0.5	0.5					
Q2	5.5	0.2		2.9	1.5	4.0					
Q Average	12.6	3.7		16.0	10.9	18.2					
Q Spacing	25.0	25.0		25.0	25.0	25.0					
Q Storage	0	0		0	0	0					
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2		1.2	1.2	1.2					
BOQ	14.8	4.4		18.7	12.8	21.2					
QSRatio											
85th Percentile Output:											
fB%	1.5	1.6		1.5	1.5	1.5					
BOQ	18.9	5.8		23.6	16.4	26.7					
QSRatio											
90th Percentile Output:											
fB%	1.6	1.7		1.6	1.6	1.6					
BOQ	20.4	6.4		25.3	17.8	28.4					
QSRatio											
95th Percentile Output:											
fB%	1.8	2.0		1.7	1.8	1.7					
BOQ	22.7	7.3		27.9	19.9	31.3					
QSRatio											
98th Percentile Output:											
fB%	2.1	2.5		2.0	2.1	1.9					
BOQ	26.3	9.0		31.9	23.2	35.5					
QSRatio											

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 SB Ramps

Inter.: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
LGConfig		T	R	L	T						LTR	
Volume		1298	227	63	437					502	118	233
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
WB Left	A				SB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	6.0	14.8	16.3	0.0		24.6	0.0		
Yellow	3.0	4.0	4.0			3.3			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1601	3547	0.85	0.45	24.3	C	22.8	C
R	714	1583	0.33	0.45	14.5	B		
Westbound								
L	133	1770	0.50	0.08	38.4	D		
T	2044	3547	0.23	0.58	8.3	A	12.1	B
Northbound								
Southbound								
LTR	1016	3304	0.88	0.31	35.6	D	35.6	D

Intersection Delay = 24.7 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Baker at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 SB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1298	227	63	437					502	118	233
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		342	60	17	115					132	31	61
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900	1900	1900						1900	
ParkExist												
NumPark												
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
LGConfig		T	R	L	T						LTR	
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0
Adj Flow		1366	239	66	460						897	
%InSharedLn												
Prop LTs		0.000			0.000						0.589	
Prop RTs		0.000	1.000		0.000						0.273	
Peds Bikes		0						0			0	
Buses		0	0	0	0						0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0	0.0	0.0						0.0	
Arriv. Type		3	3	3	3						3	
Unit Ext.		3.0	3.0	3.0	3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0	2.0	2.0						2.0	
Ext of g		2.0	2.0	2.0	2.0						2.0	
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination 1 2 3 4 | 5 6 7 8

EB Left | NB Left
Thru A A | Thru
Right A A | Right
Peds | Peds

WB Left A | SB Left A
Thru A A A | Thru A
Right | Right A
Peds | Peds

NB Right | EB Right

SB Right | WB Right

Green	6.0	14.8	16.3	0.0		24.6	0.0	
Yellow	3.0	4.0	4.0			3.3		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1298	227	63	437					502	118	233
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		1366	239	66	460					528	124	245
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
Lane group		T	R	L	T						LTR	
Adj flow		1366	239	66	460						897	
Prop LTs		0.000			0.000						0.589	
Prop RTs		0.000	1.000		0.000						0.273	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound					Southbound	
LG	T	R	L	T						LTR	
So	1900	1900	1900	1900						1900	
Lanes	0 2	1	1	2	0	0	0	0	0	2	0
fW	1.000	1.000	1.000	1.000						1.000	
fHV	0.980	0.980	0.980	0.980						0.980	
fG	1.000	1.000	1.000	1.000						1.000	
fP	1.000	1.000	1.000	1.000						1.000	
fBB	1.000	1.000	1.000	1.000						1.000	
fA	1.000	1.000	1.000	1.000						1.000	
fLU	0.952	1.000	1.000	0.952						0.952	
fRT	1.000	0.850		1.000						0.959	
fLT	1.000		0.950	1.000						0.971	
Sec.											
fLpb	1.000		1.000	1.000						1.000	
fRpb	1.000	1.000		1.000						1.000	
S	3547	1583	1770	3547						3304	
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1366	3547	# 0.39	0.45	1601	0.85
Right	R	239	1583	0.15	0.45	714	0.33
Westbound							
Prot							
Perm							
Left	L	66	1770	# 0.04	0.08	133	0.50
Prot							
Perm							
Thru	T	460	3547	0.13	0.58	2044	0.23
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LTR	897	3304	# 0.27	0.31	1016	0.88
Right							

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.69
Total lost time per cycle, L = 13.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.83

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.85	0.45	19.6	1.000	1601	0.39	4.7	0.0	24.3	C	22.8	C
R	0.33	0.45	14.2	1.000	714	0.11	0.3	0.0	14.5	B		
Westbound												
L	0.50	0.08	35.5	1.000	133	0.11	2.9	0.0	38.4	D		
T	0.23	0.58	8.3	1.000	2044	0.11	0.1	0.0	8.3	A	12.1	B
Northbound												
Southbound												

LTR 0.88 0.31 26.3 1.000 1016 0.41   9.3   0.0   35.6   D   35.6   D

Intersection delay = 24.7 (sec/veh)   Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.589
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	22.0	19.6	0.00	0.0	0.0	24.3
R	0.0	0.00	22.0	14.2	0.00	0.0	0.0	14.5
Westbound								
L	0.0	0.00	37.0	35.5	0.00	0.0	0.0	38.4
T	0.0	0.00	17.0	8.3	0.00	0.0	0.0	8.3
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LTR	0.0	0.00	27.7	26.3	0.00	0.0	0.0	35.6
	0.0						0.0	

Intersection Delay 24.7 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound			Southbound		
LaneGroup	T	R	L	T					LTR		
Init Queue	0.0	0.0	0.0	0.0					0.0		
Flow Rate	717	239	66	241					471		
So	1900	1900	1900	1900					1900		
No.Lanes	0 2	1	1	2	0	0	0	0	2	0	
SL	1862	1583	1770	1862					1735		
LnCapacity	840	714	133	1073					533		
Flow Ratio	0.4	0.2	0.0	0.1					0.3		
v/c Ratio	0.85	0.33	0.50	0.22					0.88		
Grn Ratio	0.45	0.45	0.08	0.58					0.31		
I Factor	1.000			1.000					1.000		
AT or PVG	3	3	3	3					3		
Pltn Ratio	1.00	1.00	1.00	1.00					1.00		
PF2	1.00	1.00	1.00	1.00					1.00		
Q1	14.2	3.4	1.4	2.6					10.0		
kB	0.6	0.5	0.2	0.7					0.4		
Q2	2.8	0.3	0.2	0.2					2.5		
Q Average	17.1	3.7	1.6	2.8					12.5		
Q Spacing	25.0	25.0	25.0	25.0					25.0		
Q Storage	0	0	0	0					0		
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2	1.2	1.2					1.2		
BOQ	19.9	4.4	1.9	3.3					14.6		
QSRatio											
85th Percentile Output:											
fB%	1.5	1.6	1.6	1.6					1.5		
BOQ	25.1	5.8	2.5	4.4					18.7		
QSRatio											
90th Percentile Output:											
fB%	1.6	1.7	1.8	1.7					1.6		
BOQ	26.8	6.4	2.8	4.9					20.1		
QSRatio											
95th Percentile Output:											
fB%	1.7	2.0	2.0	2.0					1.8		
BOQ	29.6	7.4	3.3	5.6					22.5		
QSRatio											
98th Percentile Output:											
fB%	2.0	2.5	2.6	2.5					2.1		
BOQ	33.6	9.1	4.1	7.0					26.0		
QSRatio											

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 SB Ramps

Inter.: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
LGConfig		T	R	L	T						LTR	
Volume		607	433	240	1069					203	296	451
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	14.1	14.4	6.4	0.0		26.8	0.0	
Yellow	3.0	4.0	4.0			3.3		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1144	3547	0.56	0.32	23.0	C	31.6	C
R	511	1583	0.89	0.32	43.6	D		
Westbound								
L	312	1770	0.81	0.18	46.5	D		
T	1946	3547	0.58	0.55	12.4	B	18.6	B
Northbound								
Southbound								
LTR	1092	3259	0.92	0.33	37.5	D	37.5	D

Intersection Delay = 28.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Baker at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 SB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		607	433	240	1069					203	296	451
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		160	114	63	281					53	78	119
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900	1900	1900						1900	
ParkExist												
NumPark												
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
LGConfig		T	R	L	T						LTR	
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0
Adj Flow		639	456	253	1125						1001	
%InSharedLn												
Prop LTs		0.000			0.000						0.214	
Prop RTs		0.000	1.000		0.000						0.475	
Peds Bikes		0						0			0	
Buses		0	0	0	0						0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0	0.0	0.0						0.0	
Arriv. Type		3	3	3	3						3	
Unit Ext.		3.0	3.0	3.0	3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0	2.0	2.0						2.0	
Ext of g		2.0	2.0	2.0	2.0						2.0	
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	14.1	14.4	6.4	0.0		26.8	0.0	
Yellow	3.0	4.0	4.0			3.3		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		607	433	240	1069					203	296	451
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		639	456	253	1125					214	312	475
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
Lane group		T	R	L	T						LTR	
Adj flow		639	456	253	1125						1001	
Prop LTs		0.000			0.000						0.214	
Prop RTs		0.000	1.000		0.000						0.475	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound				Southbound	
LG	T	R	L	T					LTR	
So	1900	1900	1900	1900					1900	
Lanes	0 2	1	1	2	0	0	0	0	2	0
fW	1.000	1.000	1.000	1.000					1.000	
fHV	0.980	0.980	0.980	0.980					0.980	
fG	1.000	1.000	1.000	1.000					1.000	
fP	1.000	1.000	1.000	1.000					1.000	
fBB	1.000	1.000	1.000	1.000					1.000	
fA	1.000	1.000	1.000	1.000					1.000	
fLU	0.952	1.000	1.000	0.952					0.952	
fRT	1.000	0.850		1.000					0.929	
fLT	1.000		0.950	1.000					0.989	
Sec.										
fLpb	1.000		1.000	1.000					1.000	
fRpb	1.000	1.000		1.000					1.000	
S	3547	1583	1770	3547					3259	
Sec.										

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	639	3547		0.18	0.32	1144	0.56
Right	R	456	1583	#	0.29	0.32	511	0.89
Westbound								
Prot								
Perm								
Left	L	253	1770	#	0.14	0.18	312	0.81
Prot								
Perm								
Thru	T	1125	3547		0.32	0.55	1946	0.58
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	1001	3259	#	0.31	0.33	1092	0.92
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.74
Total lost time per cycle, L = 13.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.89

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.56	0.32	22.4	1.000	1144	0.16	0.6	0.0	23.0	C	31.6	C
R	0.89	0.32	25.8	1.000	511	0.42	17.8	0.0	43.6	D		
Westbound												
L	0.81	0.18	31.7	1.000	312	0.35	14.8	0.0	46.5	D		
T	0.58	0.55	11.9	1.000	1946	0.17	0.4	0.0	12.4	B	18.6	B
Northbound												
Southbound												

LTR 0.92 0.33 25.5 1.000 1092 0.44 12.0 0.0 37.5 D 37.5 D

Intersection delay = 28.1 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.214
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	27.1	22.4	0.00	0.0	0.0	23.0
R	0.0	0.00	27.1	25.8	0.00	0.0	0.0	43.6
Westbound								
L	0.0	0.00	33.0	31.7	0.00	0.0	0.0	46.5
T	0.0	0.00	18.0	11.9	0.00	0.0	0.0	12.4
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LTR	0.0	0.00	26.6	25.5	0.00	0.0	0.0	37.5
	0.0						0.0	

Intersection Delay 28.1 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound			Southbound		
LaneGroup	T	R	L	T					LTR		
Init Queue	0.0	0.0	0.0	0.0					0.0		
Flow Rate	335	456	253	590					525		
So	1900	1900	1900	1900					1900		
No.Lanes	0 2	1	1	2	0	0	0	0	2	0	
SL	1862	1583	1770	1862					1711		
LnCapacity	600	511	312	1022					573		
Flow Ratio	0.2	0.3	0.1	0.3					0.3		
v/c Ratio	0.56	0.89	0.81	0.58					0.92		
Grn Ratio	0.32	0.32	0.18	0.55					0.33		
I Factor	1.000			1.000					1.000		
AT or PVG	3	3	3	3					3		
Pltn Ratio	1.00	1.00	1.00	1.00					1.00		
PF2	1.00	1.00	1.00	1.00					1.00		
Q1	6.2	9.6	5.4	8.7					11.2		
kB	0.5	0.4	0.3	0.7					0.5		
Q2	0.6	2.6	1.2	0.9					3.3		
Q Average	6.7	12.2	6.6	9.5					14.5		
Q Spacing	25.0	25.0	25.0	25.0					25.0		
Q Storage	0	0	0	0					0		
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2	1.2	1.2					1.2		
BOQ	8.0	14.3	7.8	11.2					16.9		
QSRatio											
85th Percentile Output:											
fB%	1.5	1.5	1.5	1.5					1.5		
BOQ	10.4	18.3	10.1	14.5					21.5		
QSRatio											
90th Percentile Output:											
fB%	1.7	1.6	1.7	1.6					1.6		
BOQ	11.4	19.8	11.1	15.7					23.0		
QSRatio											
95th Percentile Output:											
fB%	1.9	1.8	1.9	1.9					1.8		
BOQ	12.9	22.1	12.6	17.7					25.6		
QSRatio											
98th Percentile Output:											
fB%	2.3	2.1	2.3	2.2					2.0		
BOQ	15.5	25.6	15.2	20.8					29.3		
QSRatio											

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 NB Ramps

Inter.: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound				Southbound		
	L	T	R	L	T	R	L	T	R		L	T	R
No. Lanes	1	2	0	0	2	0	0	2	1		0	0	0
LGConfig	L	T			TR			LT	R				
Volume	236	375			759	500	121	684	75				
Lane Width	12.0	12.0			12.0			12.0	12.0				
RTOR Vol						0			0				

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	12.8	9.6	23.7	0.0		24.7	0.0		
Yellow	3.6	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	252	1770	0.98	0.14	90.6	F		
T	2195	3547	0.18	0.62	7.4	A	39.5	D
Westbound								
TR	1419	3335	0.93	0.43	36.2	D	36.2	D
Northbound								
LT	966	3520	0.88	0.27	40.4	D	39.1	D
R	434	1583	0.18	0.27	25.1	C		
Southbound								

Intersection Delay = 37.8 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Paularino at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 NB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	236	375			759	500	121	684	75			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	62	99			200	132	32	180	20			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900			1900	1900			
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	0	0	2	1	0	0	0
LGConfig	L	T			TR			LT	R			
Lane Width	12.0	12.0			12.0			12.0	12.0			
RTOR Vol						0			0			
Adj Flow	248	395			1325			847	79			
%InSharedLn												
Prop LTs		0.000			0.000			0.150				
Prop RTs		0.000			0.397			0.000	1.000			
Peds Bikes					0			0			0	
Buses	0	0			0			0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0			0.0	0.0			
Arriv. Type	3	3			3			3	3			
Unit Ext.	3.0	3.0			3.0			3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0			2.0	2.0			
Ext of g	2.0	2.0			2.0			2.0	2.0			
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	12.8	9.6	23.7	0.0		24.7	0.0		
Yellow	3.6	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	236	375			759	500	121	684	75			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	248	395			799	526	127	720	79			
No. Lanes	1	2	0	0	2	0	0	2	1	0	0	0
Lane group	L	T			TR			LT	R			
Adj flow	248	395			1325			847	79			
Prop LTs		0.000			0.000			0.150				
Prop RTs		0.000			0.397			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound				Northbound				Southbound			
LG	L	T			TR				LT	R						
So	1900	1900			1900				1900	1900						
Lanes	1	2	0	0	2	0	0		2	1	0	0	0			
fW	1.000	1.000			1.000				1.000	1.000						
fHV	0.980	0.980			0.980				0.980	0.980						
fG	1.000	1.000			1.000				1.000	1.000						
fP	1.000	1.000			1.000				1.000	1.000						
fBB	1.000	1.000			1.000				1.000	1.000						
fA	1.000	1.000			1.000				1.000	1.000						
fLU	1.000	0.952			0.952				0.952	1.000						
fRT		1.000			0.940				1.000	0.850						
fLT	0.950	1.000			1.000				0.993							
Sec.																
fLpb	1.000	1.000			1.000				1.000							
fRpb		1.000			1.000				1.000	1.000						
S	1770	3547			3335				3520	1583						
Sec.																

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	248	1770	#	0.14	0.14	252	0.98
Prot								
Perm								
Thru	T	395	3547		0.11	0.62	2195	0.18
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1325	3335	#	0.40	0.43	1419	0.93
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	847	3520	#	0.24	0.27	966	0.88
Right	R	79	1583		0.05	0.27	434	0.18
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.78
Total lost time per cycle, L = 14.20 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.92

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.98	0.14	38.5	1.000	252	0.49	52.1	0.0	90.6	F		
T	0.18	0.62	7.4	1.000	2195	0.11	0.0	0.0	7.4	A	39.5	D
Westbound												
TR	0.93	0.43	24.6	1.000	1419	0.45	11.6	0.0	36.2	D	36.2	D
Northbound												
LT	0.88	0.27	31.2	1.000	966	0.40	9.2	0.0	40.4	D	39.1	D
R	0.18	0.27	24.9	1.000	434	0.11	0.2	0.0	25.1	C		
Southbound												

Intersection delay = 37.8 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.150	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	90.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	38.6	38.5	0.00	0.0	0.0	90.6

T	0.0	0.00	17.1	7.4	0.00	0.0	0.0	7.4
	0.0						0.0	
Westbound								
	0.0						0.0	
TR	0.0	0.00	25.8	24.6	0.00	0.0	0.0	36.2
	0.0						0.0	
Northbound								
	0.0						0.0	
LT	0.0	0.00	32.6	31.2	0.00	0.0	0.0	40.4
R	0.0	0.00	32.6	24.9	0.00	0.0	0.0	25.1
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 37.8 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	T		TR			LT	R				
Init Queue	0.0	0.0		0.0			0.0	0.0				
Flow Rate	248	207		695			444	79				
So	1900	1900		1900			1900	1900				
No.Lanes	1	2	0	0	2	0	0	2	1	0	0	0
SL	1770	1862		1751			1848	1583				
LnCapacity	252	1152		745			507	434				
Flow Ratio	0.1	0.1		0.4			0.2	0.0				
v/c Ratio	0.98	0.18		0.93			0.88	0.18				
Grn Ratio	0.14	0.62		0.43			0.27	0.27				
I Factor		1.000		1.000			1.000					
AT or PVG	3	3		3			3	3				
Pltn Ratio	1.00	1.00		1.00			1.00	1.00				
PF2	1.00	1.00		1.00			1.00	1.00				
Q1	6.2	2.2		16.6			10.6	1.5				
kB	0.3	0.8		0.6			0.5	0.4				
Q2	2.8	0.2		4.6			2.5	0.1				
Q Average	9.0	2.4		21.2			13.1	1.6				
Q Spacing	25.0	25.0		25.0			25.0	25.0				
Q Storage	0	0		0			0	0				
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2		1.2			1.2	1.2				
BOQ	10.6	2.8		24.5			15.3	1.9				
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6		1.4			1.5	1.6				
BOQ	13.7	3.8		30.7			19.5	2.5				
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8		1.5			1.6	1.8				
BOQ	14.9	4.2		32.6			21.0	2.8				
QSRatio												
95th Percentile Output:												
fB%	1.9	2.0		1.7			1.8	2.0				
BOQ	16.8	4.8		35.7			23.4	3.3				
QSRatio												
98th Percentile Output:												
fB%	2.2	2.5		1.9			2.1	2.6				
BOQ	19.8	6.0		40.1			27.0	4.1				
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 NB Ramps

Inter.: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound				Southbound		
	L	T	R	L	T	R	L	T	R		L	T	R
No. Lanes	1	2	0	0	2	0	0	2	1		0	0	0
LGConfig	L	T			TR			LT	R				
Volume	236	375			759	500	121	684	75				
Lane Width	12.0	12.0			12.0			12.0	12.0				
RTOR Vol						0			0				

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	12.8	9.6	23.7	0.0		24.7	0.0		
Yellow	3.6	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	252	1770	0.98	0.14	90.6	F		
T	2195	3547	0.18	0.62	7.4	A	39.5	D
Westbound								
TR	1419	3335	0.93	0.43	36.2	D	36.2	D
Northbound								
LT	966	3520	0.88	0.27	40.4	D	39.1	D
R	434	1583	0.18	0.27	25.1	C		
Southbound								

Intersection Delay = 37.8 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Paularino at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 NB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	236	375			759	500	121	684	75			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	62	99			200	132	32	180	20			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900			1900	1900			
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	0	0	2	1	0	0	0
LGConfig	L	T			TR			LT	R			
Lane Width	12.0	12.0			12.0			12.0	12.0			
RTOR Vol						0			0			
Adj Flow	248	395			1325			847	79			
%InSharedLn												
Prop LTs		0.000			0.000			0.150				
Prop RTs		0.000			0.397			0.000	1.000			
Peds Bikes					0			0			0	
Buses	0	0			0			0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0			0.0	0.0			
Arriv. Type	3	3			3			3	3			
Unit Ext.	3.0	3.0			3.0			3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0			2.0	2.0			
Ext of g	2.0	2.0			2.0			2.0	2.0			
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	12.8	9.6	23.7	0.0		24.7	0.0		
Yellow	3.6	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	236	375			759	500	121	684	75			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	248	395			799	526	127	720	79			
No. Lanes	1	2	0	0	2	0	0	2	1	0	0	0
Lane group	L	T			TR			LT	R			
Adj flow	248	395			1325			847	79			
Prop LTs		0.000			0.000			0.150				
Prop RTs		0.000			0.397			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound				Northbound				Southbound			
LG	L	T			TR				LT	R						
So	1900	1900			1900				1900	1900						
Lanes	1	2	0	0	2	0	0		2	1	0	0	0			
fW	1.000	1.000			1.000				1.000	1.000						
fHV	0.980	0.980			0.980				0.980	0.980						
fG	1.000	1.000			1.000				1.000	1.000						
fP	1.000	1.000			1.000				1.000	1.000						
fBB	1.000	1.000			1.000				1.000	1.000						
fA	1.000	1.000			1.000				1.000	1.000						
fLU	1.000	0.952			0.952				0.952	1.000						
fRT		1.000			0.940				1.000	0.850						
fLT	0.950	1.000			1.000				0.993							
Sec.																
fLpb	1.000	1.000			1.000				1.000							
fRpb		1.000			1.000				1.000	1.000						
S	1770	3547			3335				3520	1583						
Sec.																

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	248	1770	#	0.14	0.14	252	0.98
Prot								
Perm								
Thru	T	395	3547		0.11	0.62	2195	0.18
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1325	3335	#	0.40	0.43	1419	0.93
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	847	3520	#	0.24	0.27	966	0.88
Right	R	79	1583		0.05	0.27	434	0.18
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.78
Total lost time per cycle, L = 14.20 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.92

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.98	0.14	38.5	1.000	252	0.49	52.1	0.0	90.6	F		
T	0.18	0.62	7.4	1.000	2195	0.11	0.0	0.0	7.4	A	39.5	D
Westbound												
TR	0.93	0.43	24.6	1.000	1419	0.45	11.6	0.0	36.2	D	36.2	D
Northbound												
LT	0.88	0.27	31.2	1.000	966	0.40	9.2	0.0	40.4	D	39.1	D
R	0.18	0.27	24.9	1.000	434	0.11	0.2	0.0	25.1	C		
Southbound												

Intersection delay = 37.8 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.150	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	90.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	38.6	38.5	0.00	0.0	0.0	90.6

T	0.0	0.00	17.1	7.4	0.00	0.0	0.0	7.4
	0.0						0.0	
Westbound								
	0.0						0.0	
TR	0.0	0.00	25.8	24.6	0.00	0.0	0.0	36.2
	0.0						0.0	
Northbound								
	0.0						0.0	
LT	0.0	0.00	32.6	31.2	0.00	0.0	0.0	40.4
R	0.0	0.00	32.6	24.9	0.00	0.0	0.0	25.1
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 37.8 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	T		TR			LT	R				
Init Queue	0.0	0.0		0.0			0.0	0.0				
Flow Rate	248	207		695			444	79				
So	1900	1900		1900			1900	1900				
No.Lanes	1	2	0	0	2	0	0	2	1	0	0	0
SL	1770	1862		1751			1848	1583				
LnCapacity	252	1152		745			507	434				
Flow Ratio	0.1	0.1		0.4			0.2	0.0				
v/c Ratio	0.98	0.18		0.93			0.88	0.18				
Grn Ratio	0.14	0.62		0.43			0.27	0.27				
I Factor		1.000		1.000			1.000					
AT or PVG	3	3		3			3	3				
Pltn Ratio	1.00	1.00		1.00			1.00	1.00				
PF2	1.00	1.00		1.00			1.00	1.00				
Q1	6.2	2.2		16.6			10.6	1.5				
kB	0.3	0.8		0.6			0.5	0.4				
Q2	2.8	0.2		4.6			2.5	0.1				
Q Average	9.0	2.4		21.2			13.1	1.6				
Q Spacing	25.0	25.0		25.0			25.0	25.0				
Q Storage	0	0		0			0	0				
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2		1.2			1.2	1.2				
BOQ	10.6	2.8		24.5			15.3	1.9				
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6		1.4			1.5	1.6				
BOQ	13.7	3.8		30.7			19.5	2.5				
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8		1.5			1.6	1.8				
BOQ	14.9	4.2		32.6			21.0	2.8				
QSRatio												
95th Percentile Output:												
fB%	1.9	2.0		1.7			1.8	2.0				
BOQ	16.8	4.8		35.7			23.4	3.3				
QSRatio												
98th Percentile Output:												
fB%	2.2	2.5		1.9			2.1	2.6				
BOQ	19.8	6.0		40.1			27.0	4.1				
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 SB Ramps

Inter.: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
LGConfig		TR		L	T						LTR	
Volume		865	134	69	191					570	710	201
Lane Width		12.0		12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	4.8	6.7	20.8	0.0		48.9	0.0	
Yellow	3.2	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	1129	3475	0.93	0.32	46.2	D	46.2	D
Westbound								
L	85	1770	0.86	0.05	101.5	F		
T	1472	3547	0.14	0.41	18.2	B	40.4	D
Northbound								
Southbound								
LTR	1667	3409	0.94	0.49	34.4	C	34.4	C

Intersection Delay = 39.3 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Paularino at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 SB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		865	134	69	191					570	710	201
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		228	35	18	50					150	187	53
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900		1900	1900						1900	
ParkExist												
NumPark												
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
LGConfig		TR		L	T						LTR	
Lane Width		12.0		12.0	12.0						12.0	
RTOR Vol			0									0
Adj Flow		1052		73	201						1559	
%InSharedLn												
Prop LTs		0.000			0.000						0.385	
Prop RTs		0.134			0.000						0.136	
Peds Bikes		0						0			0	
Buses		0		0	0						0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0						0.0	
Arriv. Type		3		3	3						3	
Unit Ext.		3.0		3.0	3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0		2.0	2.0						2.0	
Ext of g		2.0		2.0	2.0						2.0	
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
WB Left	A				SB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	4.8	6.7	20.8	0.0		48.9	0.0		
Yellow	3.2	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		865	134	69	191					570	710	201
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		911	141	73	201					600	747	212
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
Lane group		TR		L	T						LTR	
Adj flow		1052		73	201						1559	
Prop LTs		0.000			0.000						0.385	
Prop RTs		0.134			0.000						0.136	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound			Northbound			Southbound		
LG	TR		L	T					LTR		
So	1900		1900	1900					1900		
Lanes	0 2	0	1	2	0	0	0	0	2	0	
fW	1.000		1.000	1.000					1.000		
fHV	0.980		0.980	0.980					0.980		
fG	1.000		1.000	1.000					1.000		
fP	1.000		1.000	1.000					1.000		
fBB	1.000		1.000	1.000					1.000		
fA	1.000		1.000	1.000					1.000		
fLU	0.952		1.000	0.952					0.952		
fRT	0.980			1.000					0.980		
fLT	1.000		0.950	1.000					0.981		
Sec.											
fLpb	1.000		1.000	1.000					1.000		
fRpb	1.000			1.000					1.000		
S	3475		1770	3547					3409		
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1052	3475	#	0.30	0.32	1129	0.93
Right								
Westbound								
Prot								
Perm								
Left	L	73	1770	#	0.04	0.05	85	0.86
Prot								
Perm								
Thru	T	201	3547		0.06	0.41	1472	0.14
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	1559	3409	#	0.46	0.49	1667	0.94
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.80
Total lost time per cycle, L = 13.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.93

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	0.93	0.32	32.7	1.000	1129	0.45	13.5	0.0	46.2	D	46.2	D
Westbound												
L	0.86	0.05	47.3	1.000	85	0.39	54.2	0.0	101.5	F		
T	0.14	0.41	18.1	1.000	1472	0.11	0.0	0.0	18.2	B	40.4	D
Northbound												
Southbound												

LTR	0.94	0.49	24.1	1.000	1667	0.45	10.3	0.0	34.4	C	34.4	C

Intersection delay = 39.3 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.385
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	100.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	33.8	32.7	0.00	0.0	0.0	46.2
	0.0						0.0	
Westbound								
L	0.0	0.00	47.6	47.3	0.00	0.0	0.0	101.5
T	0.0	0.00	29.3	18.1	0.00	0.0	0.0	18.2
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LTR	0.0	0.00	25.5	24.1	0.00	0.0	0.0	34.4
	0.0						0.0	

Intersection Delay 39.3 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup	TR	L T		LTR
Init Queue	0.0	0.0 0.0		0.0
Flow Rate	552	73 105		818
So	1900	1900 1900		1900
No.Lanes	0 2 0	1 2 0	0 0 0	0 2 0
SL	1825	1770 1862		1790
LnCapacity	592	85 773		875
Flow Ratio	0.3	0.0 0.1		0.5
v/c Ratio	0.93	0.86 0.14		0.93
Grn Ratio	0.32	0.05 0.41		0.49
I Factor	1.000	1.000		1.000
AT or PVG	3	3 3		3
Pltn Ratio	1.00	1.00 1.00		1.00
PF2	1.00	1.00 1.00		1.00
Q1	14.9	2.0 1.8		21.4
kB	0.5	0.2 0.6		0.7
Q2	4.1	0.7 0.1		5.5
Q Average	18.9	2.7 1.9		26.9
Q Spacing	25.0	25.0 25.0		25.0
Q Storage	0	0 0		0
Q S Ratio				
70th Percentile Output:				
fB%	1.2	1.2 1.2		1.2
BOQ	22.0	3.2 2.3		30.9
QSRatio				
85th Percentile Output:				
fB%	1.5	1.6 1.6		1.4
BOQ	27.6	4.3 3.0		38.2
QSRatio				
90th Percentile Output:				
fB%	1.6	1.7 1.8		1.5
BOQ	29.4	4.7 3.4		40.4
QSRatio				
95th Percentile Output:				
fB%	1.7	2.0 2.0		1.6
BOQ	32.4	5.5 3.9		44.0
QSRatio				
98th Percentile Output:				
fB%	1.9	2.5 2.6		1.8
BOQ	36.6	6.8 4.9		49.1
QSRatio				

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 SB Ramps

Inter.: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
LGConfig		TR		L	T						LTR	
Volume		462	115	202	684					118	594	296
Lane Width		12.0		12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	10.6	5.0	5.0	0.0	25.5	0.0		
Yellow	3.2	4.0	4.0		3.6			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 64.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	795	3441	0.76	0.23	27.7	C	27.7	C
Westbound								
L	289	1770	0.74	0.16	35.4	D		
T	1629	3547	0.44	0.46	12.1	B	17.4	B
Northbound								
Southbound								
LTR	1325	3371	0.80	0.39	21.1	C	21.1	C

Intersection Delay = 21.3 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Paularino at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 SB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		462	115	202	684					118	594	296
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		122	30	53	180					31	156	78
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900		1900	1900						1900	
ParkExist												
NumPark												
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
LGConfig		TR		L	T						LTR	
Lane Width		12.0		12.0	12.0						12.0	
RTOR Vol			0									0
Adj Flow		607		213	720						1061	
%InSharedLn												
Prop LTs		0.000			0.000						0.117	
Prop RTs		0.199			0.000						0.294	
Peds Bikes		0						0			0	
Buses		0		0	0						0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0						0.0	
Arriv. Type		3		3	3						3	
Unit Ext.		3.0		3.0	3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0		2.0	2.0						2.0	
Ext of g		2.0		2.0	2.0						2.0	
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	10.6	5.0	5.0	0.0		25.5	0.0	
Yellow	3.2	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 64.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		462	115	202	684					118	594	296
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		486	121	213	720					124	625	312
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
Lane group		TR		L	T						LTR	
Adj flow		607		213	720						1061	
Prop LTs		0.000			0.000						0.117	
Prop RTs		0.199			0.000						0.294	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound				Southbound		
LG	TR		L	T					LTR		
So	1900		1900	1900					1900		
Lanes	0 2	0	1	2	0	0	0	0	0	2	0
fW	1.000		1.000	1.000						1.000	
fHV	0.980		0.980	0.980						0.980	
fG	1.000		1.000	1.000						1.000	
fP	1.000		1.000	1.000						1.000	
fBB	1.000		1.000	1.000						1.000	
fA	1.000		1.000	1.000						1.000	
fLU	0.952		1.000	0.952						0.952	
fRT	0.970			1.000						0.956	
fLT	1.000		0.950	1.000						0.994	
Sec.											
fLpb	1.000		1.000	1.000						1.000	
fRpb	1.000			1.000						1.000	
S	3441		1770	3547						3371	
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	607	3441	#	0.18	0.23	795	0.76
Right								
Westbound								
Prot								
Perm								
Left	L	213	1770	#	0.12	0.16	289	0.74
Prot								
Perm								
Thru	T	720	3547		0.20	0.46	1629	0.44
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	1061	3371	#	0.31	0.39	1325	0.80
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.61
Total lost time per cycle, L = 13.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.78

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	0.76	0.23	23.3	1.000	795	0.32	4.4	0.0	27.7	C	27.7	C
Westbound												
L	0.74	0.16	25.8	1.000	289	0.29	9.5	0.0	35.4	D		
T	0.44	0.46	11.9	1.000	1629	0.11	0.2	0.0	12.1	B	17.4	B
Northbound												
Southbound												

LTR	0.80	0.39	17.4	1.000	1325	0.34	3.6	0.0	21.1	C	21.1	C

Intersection delay = 21.3 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 64.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 64.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.117
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	64.9 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	24.9	23.3	0.00	0.0	0.0	27.7
	0.0						0.0	
Westbound								
L	0.0	0.00	27.1	25.8	0.00	0.0	0.0	35.4
T	0.0	0.00	17.5	11.9	0.00	0.0	0.0	12.1
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LTR	0.0	0.00	19.7	17.4	0.00	0.0	0.0	21.1
	0.0						0.0	

Intersection Delay 21.3 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup	TR	L T		LTR
Init Queue	0.0	0.0 0.0		0.0
Flow Rate	318	213 378		557
So	1900	1900 1900		1900
No.Lanes	0 2 0	1 2 0	0 0 0	0 2 0
SL	1807	1770 1862		1770
LnCapacity	417	289 855		695
Flow Ratio	0.2	0.1 0.2		0.3
v/c Ratio	0.76	0.74 0.44		0.80
Grn Ratio	0.23	0.16 0.46		0.39
I Factor	1.000	1.000		1.000
AT or PVG	3	3 3		3
Pltn Ratio	1.00	1.00 1.00		1.00
PF2	1.00	1.00 1.00		1.00
Q1	5.4	3.7 4.6		8.9
kB	0.3	0.3 0.5		0.5
Q2	1.0	0.7 0.4		1.7
Q Average	6.3	4.4 5.0		10.6
Q Spacing	25.0	25.0 25.0		25.0
Q Storage	0	0 0		0
Q S Ratio				
70th Percentile Output:				
fB%	1.2	1.2 1.2		1.2
BOQ	7.5	5.2 6.0		12.4
QSRatio				
85th Percentile Output:				
fB%	1.5	1.6 1.6		1.5
BOQ	9.8	6.8 7.8		16.0
QSRatio				
90th Percentile Output:				
fB%	1.7	1.7 1.7		1.6
BOQ	10.7	7.5 8.6		17.3
QSRatio				
95th Percentile Output:				
fB%	1.9	2.0 2.0		1.8
BOQ	12.2	8.6 9.8		19.4
QSRatio				
98th Percentile Output:				
fB%	2.3	2.4 2.4		2.1
BOQ	14.7	10.5 12.0		22.7
QSRatio				

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 NB Ramps

Inter.: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Volume		1324	620		662	280	1028		696			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru		A			Thru				
Right		A	A		Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right		A	A		EB Right	A			
SB Right					WB Right	A			
Green		49.7	13.1	0.0		41.6	0.0		
Yellow		4.5	4.5			3.6			
All Red		1.0	1.0			1.0			

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1469	3547	0.95	0.41	47.2	D	32.2	C
R	1583	1583	0.41	1.00	0.2	A		
Westbound								
T	2888	5074	0.24	0.57	13.0	B	9.1	A
R	1583	1583	0.19	1.00	0.1	A		
Northbound								
L	1191	3437	0.91	0.35	47.7	D		
							28.5	C
R	1583	1583	0.46	1.00	0.2	A		
Southbound								

Intersection Delay = 26.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Macarthur at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1324	620		662	280	1028		696			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		348	163		174	74	271		183			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900		1900			
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			
Adj Flow		1394	653		697	295	1082		733			
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0	0	0		0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0		0.0			
Arriv. Type		3	3		3	3	3		3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0		3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0		2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0		2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru		A			Thru			
Right		A	A		Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right		A	A		EB Right	A		
SB Right					WB Right	A		
Green		49.7	13.1	0.0		41.6	0.0	
Yellow		4.5	4.5			3.6		
All Red		1.0	1.0			1.0		

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1324	620		662	280	1028		696			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		1394	653		697	295	1082		733			
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
Lane group		T	R		T	R	L		R			
Adj flow		1394	653		697	295	1082		733			
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R		L	R				
So	1900	1900		1900	1900		1900	1900				
Lanes	0 2	1	0	3	1	0	2	1	0	0	0	
fW	1.000	1.000		1.000	1.000		1.000	1.000				
fHV	0.980	0.980		0.980	0.980		0.980	0.980				
fG	1.000	1.000		1.000	1.000		1.000	1.000				
fP	1.000	1.000		1.000	1.000		1.000	1.000				
fBB	1.000	1.000		1.000	1.000		1.000	1.000				
fA	1.000	1.000		1.000	1.000		1.000	1.000				
fLU	0.952	1.000		0.908	1.000		0.971	1.000				
fRT	1.000	0.850		1.000	0.850			0.850				
fLT	1.000			1.000			0.950					
Sec.												
fLpb	1.000			1.000			1.000					
fRpb	1.000	1.000		1.000	1.000			1.000				
S	3547	1583		5074	1583		3437	1583				
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1394	3547		0.39	0.41	1469	0.95
Right	R	653	1583		0.41	1.00	1583	0.41
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	697	5074		0.14	0.57	2888	0.24
Right	R	295	1583		0.19	1.00	1583	0.19
Northbound								
Prot								
Perm								
Left	L	1082	3437		0.31	0.35	1191	0.91
Prot								
Perm								
Thru								
Right	R	733	1583	#	0.46	1.00	1583	0.46
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.46
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.46

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.95	0.41	33.9	1.000	1469	0.46	13.3	0.0	47.2	D	32.2	C
R	0.41	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Westbound												
T	0.24	0.57	12.9	1.000	2888	0.11	0.0	0.0	13.0	B	9.1	A
R	0.19	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Northbound												
L	0.91	0.35	37.4	1.000	1191	0.43	10.3	0.0	47.7	D		
											28.5	C
R	0.46	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

Intersection delay = 26.1 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	120.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	35.2	33.9	0.00	0.0	0.0	47.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
	0.0						0.0	
T	0.0	0.00	25.8	12.9	0.00	0.0	0.0	13.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Northbound								
L	0.0	0.00	39.2	37.4	0.00	0.0	0.0	47.7
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 26.1 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound			Southbound		
LaneGroup	T	R	T	R	L		R			
Init Queue	0.0	0.0	0.0	0.0	0.0		0.0			
Flow Rate	732	653	255	295	557		733			
So	1900	1900	1900	1900	1900		1900			
No.Lanes	0 2	1	0 3	1	2	0 1		0 0	0	
SL	1862	1583	1862	1583	1770		1583			
LnCapacity	771	1583	1060	1583	613		1583			
Flow Ratio	0.4	0.4	0.1	0.2	0.3		0.5			
v/c Ratio	0.95	0.41	0.24	0.19	0.91		0.46			
Grn Ratio	0.41	1.00	0.57	1.00	0.35		1.00			
I Factor	1.000		1.000		1.000					
AT or PVG	3	3	3	3	3		3			
Pltn Ratio	1.00	1.00	1.00	1.00	1.00		1.00			
PF2	1.00		1.00		1.00					
Q1	23.6		4.2		17.7					
kB	0.7	1.1	0.8	1.1	0.6		1.1			
Q2	5.9	0.8	0.3	0.2	3.9		0.9			
Q Average	29.5		4.5		21.6					
Q Spacing	25.0	25.0	25.0	25.0	25.0		25.0			
Q Storage	0	0	0	0	0		0			
Q S Ratio										
70th Percentile Output:										
fB%	1.1		1.2		1.2					
BOQ	33.9		5.4		25.0					
QSRatio										
85th Percentile Output:										
fB%	1.4		1.6		1.4					
BOQ	41.7		7.0		31.3					
QSRatio										
90th Percentile Output:										
fB%	1.5		1.7		1.5					
BOQ	44.0		7.8		33.2					
QSRatio										
95th Percentile Output:										
fB%	1.6		2.0		1.7					
BOQ	47.7		8.9		36.3					
QSRatio										
98th Percentile Output:										
fB%	1.8		2.4		1.9					
BOQ	53.2		10.9		40.8					
QSRatio										

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 NB Ramps

Inter.: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Volume		886	760		1664	1160	696		252			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left A			
Thru	A	A			Thru			
Right	A	A			Right A			
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right A			
SB Right					WB Right A			
Green	23.0	8.0	0.0		16.4	0.0		
Yellow	1.5	4.5			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1980	3547	0.47	0.56	8.1	A	4.5	A
R	1583	1583	0.51	1.00	0.3	A		
Westbound								
T	2833	5074	0.62	0.56	9.4	A	6.5	A
R	1583	1583	0.77	1.00	2.4	A		
Northbound								
L	939	3437	0.78	0.27	24.4	C		
							18.0	B
R	1583	1583	0.17	1.00	0.1	A		
Southbound								

Intersection Delay = 7.9 (sec/veh) Intersection LOS = A

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Macarthur at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		886	760		1664	1160	696		252			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		233	200		438	305	183		66			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900		1900			
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			
Adj Flow		933	800		1752	1221	733		265			
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0	0	0		0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0		0.0			
Arriv. Type		3	3		3	3	3		3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0		3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0		2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0		2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right	A		
SB Right					WB Right	A		
Green	23.0	8.0	0.0			16.4	0.0	
Yellow	1.5	4.5				3.6		
All Red	1.0	1.0				1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		886	760		1664	1160	696		252			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		933	800		1752	1221	733		265			
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
Lane group		T	R		T	R	L		R			
Adj flow		933	800		1752	1221	733		265			
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R		L	R				
So	1900	1900		1900	1900		1900	1900				
Lanes	0 2	1	0	3	1	0	2	1	0	0	0	
fW	1.000	1.000		1.000	1.000		1.000	1.000				
fHV	0.980	0.980		0.980	0.980		0.980	0.980				
fG	1.000	1.000		1.000	1.000		1.000	1.000				
fP	1.000	1.000		1.000	1.000		1.000	1.000				
fBB	1.000	1.000		1.000	1.000		1.000	1.000				
fA	1.000	1.000		1.000	1.000		1.000	1.000				
fLU	0.952	1.000		0.908	1.000		0.971	1.000				
fRT	1.000	0.850		1.000	0.850			0.850				
fLT	1.000			1.000			0.950					
Sec.												
fLpb	1.000			1.000			1.000					
fRpb	1.000	1.000		1.000	1.000			1.000				
S	3547	1583		5074	1583		3437	1583				
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	933	3547		0.26	0.56	1980	0.47
Right	R	800	1583		0.51	1.00	1583	0.51
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1752	5074		0.35	0.56	2833	0.62
Right	R	1221	1583	#	0.77	1.00	1583	0.77
Northbound								
Prot								
Perm								
Left	L	733	3437		0.21	0.27	939	0.78
Prot								
Perm								
Thru								
Right	R	265	1583		0.17	1.00	1583	0.17
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.77
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.77

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.47	0.56	7.9	1.000	1980	0.11	0.2	0.0	8.1	A	4.5	A
R	0.51	1.00	0.0	0.950	1583	0.11	0.3	0.0	0.3	A		
Westbound												
T	0.62	0.56	8.9	1.000	2833	0.20	0.4	0.0	9.4	A	6.5	A
R	0.77	1.00	0.0	0.950	1583	0.32	2.4	0.0	2.4	A		
Northbound												
L	0.78	0.27	20.1	1.000	939	0.33	4.3	0.0	24.4	C		
											18.0	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

Intersection delay = 7.9 (sec/veh) Intersection LOS = A

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	13.3	7.9	0.00	0.0	0.0	8.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.3
Westbound								
	0.0						0.0	
T	0.0	0.00	13.3	8.9	0.00	0.0	0.0	9.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.4
Northbound								
L	0.0	0.00	21.8	20.1	0.00	0.0	0.0	24.4
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 7.9 sec/veh Intersection LOS A

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	T	R	T	R	L	R		
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0		
Flow Rate	490	800	643	1221	377	265		
So	1900	1900	1900	1900	1900	1900		
No.Lanes	0 2	1	0 3	1	2 0	1	0 0	0
SL	1862	1583	1862	1583	1770	1583		
LnCapacity	1039	1583	1040	1583	483	1583		
Flow Ratio	0.3	0.5	0.3	0.8	0.2	0.2		
v/c Ratio	0.47	0.51	0.62	0.77	0.78	0.17		
Grn Ratio	0.56	1.00	0.56	1.00	0.27	1.00		
I Factor	1.000		1.000		1.000			
AT or PVG	3	3	3	3	3	3		
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
PF2	1.00		1.00		1.00			
Q1	4.9		7.2		5.8			
kB	0.6	0.7	0.6	0.7	0.3	0.7		
Q2	0.5	0.7	0.9	2.3	1.1	0.1		
Q Average	5.4		8.1		6.9			
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0		
Q Storage	0	0	0	0	0	0		
Q S Ratio								
70th Percentile Output:								
fB%	1.2		1.2		1.2			
BOQ	6.4		9.6		8.2			
QSRatio								
85th Percentile Output:								
fB%	1.6		1.5		1.5			
BOQ	8.4		12.4		10.7			
QSRatio								
90th Percentile Output:								
fB%	1.7		1.7		1.7			
BOQ	9.2		13.5		11.7			
QSRatio								
95th Percentile Output:								
fB%	1.9		1.9		1.9			
BOQ	10.5		15.3		13.3			
QSRatio								
98th Percentile Output:								
fB%	2.4		2.2		2.3			
BOQ	12.7		18.1		15.9			
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 SB Ramps

Inter.: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Volume		1290	753		1297	153				877		951
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	12.4	7.6	0.0		24.5	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1507	3547	0.90	0.43	23.9	C	15.2	B
R	1583	1583	0.50	1.00	0.3	A		
Westbound								
T	2156	5074	0.63	0.43	14.2	B	12.7	B
R	1583	1583	0.10	1.00	0.0+	A		
Northbound								
Southbound								
L	1403	3437	0.66	0.41	15.5	B		
							20.0-	B
R	1145	2803	0.87	0.41	24.1	C		

Intersection Delay = 16.1 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: AM
Intersection: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2015
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 SB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1290	753		1297	153				877		951
% Heavy Veh		2	2		2	2				2		2
PHF		0.95	0.95		0.95	0.95				0.95		0.95
PK 15 Vol		339	198		341	40				231		250
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900		1900	1900				1900		1900
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
LGConfig		T	R		T	R				L		R
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0
Adj Flow		1358	793		1365	161				923		1001
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000
Peds Bikes	0			0			0			0		
Buses		0	0		0	0				0		0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0				0.0		0.0
Arriv. Type		3	3		3	3				3		3
Unit Ext.		3.0	3.0		3.0	3.0				3.0		3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0		2.0	2.0				2.0		2.0
Ext of g		2.0	2.0		2.0	2.0				2.0		2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	12.4	7.6	0.0		24.5	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1290	753		1297	153				877		951
PHF		0.95	0.95		0.95	0.95				0.95		0.95
Adj flow		1358	793		1365	161				923		1001
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
Lane group		T	R		T	R				L		R
Adj flow		1358	793		1365	161				923		1001
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R					L		R
So	1900	1900		1900	1900					1900		1900
Lanes	0 2	1	0	3	1	0	0	0		2	0	2
fW	1.000	1.000		1.000	1.000					1.000		1.000
fHV	0.980	0.980		0.980	0.980					0.980		0.980
fG	1.000	1.000		1.000	1.000					1.000		1.000
fP	1.000	1.000		1.000	1.000					1.000		1.000
fBB	1.000	1.000		1.000	1.000					1.000		1.000
fA	1.000	1.000		1.000	1.000					1.000		1.000
fLU	0.952	1.000		0.908	1.000					0.971		0.885
fRT	1.000	0.850		1.000	0.850							0.850
fLT	1.000			1.000						0.950		
Sec.												
fLpb	1.000			1.000						1.000		
fRpb	1.000	1.000		1.000	1.000							1.000
S	3547	1583		5074	1583					3437		2803
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1358	3547	#	0.38	0.43	1507	0.90
Right	R	793	1583		0.50	1.00	1583	0.50
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1365	5074		0.27	0.43	2156	0.63
Right	R	161	1583		0.10	1.00	1583	0.10
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	923	3437		0.27	0.41	1403	0.66
Prot								
Perm								
Thru								
Right	R	1001	2803	#	0.36	0.41	1145	0.87

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.74
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.89

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.90	0.43	16.1	1.000	1507	0.42	7.8	0.0	23.9	C	15.2	B
R	0.50	1.00	0.0	0.950	1583	0.11	0.3	0.0	0.3	A		
Westbound												
T	0.63	0.43	13.6	1.000	2156	0.21	0.6	0.0	14.2	B	12.7	B
R	0.10	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Northbound												
Southbound												
L	0.66	0.41	14.4	1.000	1403	0.23	1.1	0.0	15.5	B		

```
                                                                    20.0-  B
R    0.87  0.41  16.3  1.000 1145  0.40   7.7   0.0   24.1   C
_____________________________________________________________________________
          Intersection delay = 16.1  (sec/veh)   Intersection LOS = B


_____________________SUPPLEMENTAL PERMITTED LT WORKSHEET_____________________
                            for exclusive lefts
Input
                                                        EB    WB    NB    SB
Opposed by Single(S) or Multiple(M) lane approach
Cycle length, C                          60.0    sec
Total actual green time for LT lane group, G (s)
Effective permitted green time for LT lane group, g(s)
Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo                        0.908 0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g  or  fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____________________SUPPLEMENTAL PERMITTED LT WORKSHEET_____________________
                              for shared lefts
Input
                                                        EB    WB    NB    SB
Opposed by Single(S) or Multiple(M) lane approach
Cycle length, C                          60.0    sec
Total actual green time for LT lane group, G (s)
Effective permitted green time for LT lane group, g(s)
Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT                  0.000 0.000
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo                        0.908 0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
```

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	17.3	16.1	0.00	0.0	0.0	23.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.3
Westbound								
	0.0						0.0	
T	0.0	0.00	17.3	13.6	0.00	0.0	0.0	14.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
L	0.0	0.00	17.8	14.4	0.00	0.0	0.0	15.5
	0.0						0.0	
R	0.0	0.00	17.8	16.3	0.00	0.0	0.0	24.1

Intersection Delay 16.1 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	T	R	T	R			L	R
Init Queue	0.0	0.0	0.0	0.0			0.0	0.0
Flow Rate	713	793	501	161			475	565
So	1900	1900	1900	1900			1900	1900
No.Lanes	0 2	1	0 3	1	0 0	0	2 0	2
SL	1862	1583	1862	1583			1770	1584
LnCapacity	791	1583	791	1583			722	646
Flow Ratio	0.4	0.5	0.3	0.1			0.3	0.4
v/c Ratio	0.90	0.50	0.63	0.10			0.66	0.87
Grn Ratio	0.43	1.00	0.43	1.00			0.41	0.41
I Factor	1.000		1.000				1.000	
AT or PVG	3	3	3	3			3	3
Pltn Ratio	1.00	1.00	1.00	1.00			1.00	1.00
PF2	1.00		1.00				1.00	1.00
Q1	11.1		6.6				6.4	8.7
kB	0.5	0.7	0.5	0.7			0.4	0.4
Q2	3.2	0.7	0.8	0.1			0.8	2.4
Q Average	14.3		7.4				7.2	11.0
Q Spacing	25.0	25.0	25.0	25.0			25.0	25.0
Q Storage	0	0	0	0			0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2		1.2				1.2	1.2
BOQ	16.7		8.7				8.6	13.0
QSRatio								
85th Percentile Output:								
fB%	1.5		1.5				1.5	1.5
BOQ	21.3		11.3				11.1	16.6
QSRatio								
90th Percentile Output:								
fB%	1.6		1.7				1.7	1.6
BOQ	22.8		12.3				12.1	18.0
QSRatio								
95th Percentile Output:								
fB%	1.8		1.9				1.9	1.8
BOQ	25.3		14.0				13.8	20.1
QSRatio								
98th Percentile Output:								
fB%	2.0		2.3				2.3	2.1
BOQ	29.1		16.7				16.5	23.5
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 SB Ramps

Inter.: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Volume		1261	980		1740	700				299		760
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	17.6	7.4	0.0		19.5	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1803	3547	0.74	0.51	13.2	B	7.8	A
R	1583	1583	0.65	1.00	1.0	A		
Westbound								
T	2579	5074	0.71	0.51	12.3	B	8.8	A
R	1583	1583	0.47	1.00	0.2	A		
Northbound								
Southbound								
L	1117	3437	0.28	0.32	15.2	B		
							25.0	C
R	911	2803	0.88	0.32	28.9	C		

Intersection Delay = 11.4 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Macarthur at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 SB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1261	980		1740	700				299		760
% Heavy Veh		2	2		2	2				2		2
PHF		0.95	0.95		0.95	0.95				0.95		0.95
PK 15 Vol		332	258		458	184				79		200
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900		1900	1900				1900		1900
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
LGConfig		T	R		T	R				L		R
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0
Adj Flow		1327	1032		1832	737				315		800
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000
Peds Bikes	0			0			0			0		
Buses		0	0		0	0				0		0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0				0.0		0.0
Arriv. Type		3	3		3	3				3		3
Unit Ext.		3.0	3.0		3.0	3.0				3.0		3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0		2.0	2.0				2.0		2.0
Ext of g		2.0	2.0		2.0	2.0				2.0		2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	17.6	7.4	0.0		19.5	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1261	980		1740	700				299		760
PHF		0.95	0.95		0.95	0.95				0.95		0.95
Adj flow		1327	1032		1832	737				315		800
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
Lane group		T	R		T	R				L		R
Adj flow		1327	1032		1832	737				315		800
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R					L		R
So	1900	1900		1900	1900					1900		1900
Lanes	0 2	1	0	3	1	0	0	0		2	0	2
fW	1.000	1.000		1.000	1.000					1.000		1.000
fHV	0.980	0.980		0.980	0.980					0.980		0.980
fG	1.000	1.000		1.000	1.000					1.000		1.000
fP	1.000	1.000		1.000	1.000					1.000		1.000
fBB	1.000	1.000		1.000	1.000					1.000		1.000
fA	1.000	1.000		1.000	1.000					1.000		1.000
fLU	0.952	1.000		0.908	1.000					0.971		0.885
fRT	1.000	0.850		1.000	0.850							0.850
fLT	1.000			1.000						0.950		
Sec.												
fLpb	1.000			1.000						1.000		
fRpb	1.000	1.000		1.000	1.000							1.000
S	3547	1583		5074	1583					3437		2803
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1327	3547	#	0.37	0.51	1803	0.74
Right	R	1032	1583		0.65	1.00	1583	0.65
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1832	5074		0.36	0.51	2579	0.71
Right	R	737	1583		0.47	1.00	1583	0.47
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	315	3437		0.09	0.32	1117	0.28
Prot								
Perm								
Thru								
Right	R	800	2803	#	0.29	0.32	911	0.88

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.66
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.79

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.74	0.51	11.6	1.000	1803	0.29	1.6	0.0	13.2	B	7.8	A
R	0.65	1.00	0.0	0.950	1583	0.23	1.0	0.0	1.0	A		
Westbound												
T	0.71	0.51	11.4	1.000	2579	0.27	0.9	0.0	12.3	B	8.8	A
R	0.47	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Northbound												
Southbound												
L	0.28	0.32	15.0	1.000	1117	0.11	0.1	0.0	15.2	B		

									25.0	C
R	0.88	0.32	19.1	1.000	911	0.40	9.8	0.0	28.9	C

Intersection delay = 11.4 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	14.8	11.6	0.00	0.0	0.0	13.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.0
Westbound								
	0.0						0.0	
T	0.0	0.00	14.8	11.4	0.00	0.0	0.0	12.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
L	0.0	0.00	20.3	15.0	0.00	0.0	0.0	15.2
	0.0						0.0	
R	0.0	0.00	20.3	19.1	0.00	0.0	0.0	28.9

Intersection Delay 11.4 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	T	R	T	R			L	R
Init Queue	0.0	0.0	0.0	0.0			0.0	0.0
Flow Rate	696	1032	672	737			162	451
So	1900	1900	1900	1900			1900	1900
No.Lanes	0 2	1	0 3	1	0 0	0	2 0	2
SL	1862	1583	1862	1583			1770	1584
LnCapacity	946	1583	946	1583			575	514
Flow Ratio	0.4	0.7	0.4	0.5			0.1	0.3
v/c Ratio	0.74	0.65	0.71	0.47			0.28	0.88
Grn Ratio	0.51	1.00	0.51	1.00			0.32	0.32
I Factor	1.000		1.000				1.000	
AT or PVG	3	3	3	3			3	3
Pltn Ratio	1.00	1.00	1.00	1.00			1.00	1.00
PF2	1.00		1.00				1.00	1.00
Q1	9.1		8.6				2.0	7.1
kB	0.5	0.7	0.5	0.7			0.4	0.4
Q2	1.4	1.3	1.2	0.6			0.2	2.1
Q Average	10.5		9.9				2.2	9.2
Q Spacing	25.0	25.0	25.0	25.0			25.0	25.0
Q Storage	0	0	0	0			0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2		1.2				1.2	1.2
BOQ	12.4		11.6				2.6	10.8
QSRatio								
85th Percentile Output:								
fB%	1.5		1.5				1.6	1.5
BOQ	15.9		14.9				3.4	13.9
QSRatio								
90th Percentile Output:								
fB%	1.6		1.6				1.8	1.7
BOQ	17.2		16.2				3.8	15.1
QSRatio								
95th Percentile Output:								
fB%	1.8		1.8				2.0	1.9
BOQ	19.3		18.2				4.4	17.0
QSRatio								
98th Percentile Output:								
fB%	2.1		2.2				2.5	2.2
BOQ	22.5		21.4				5.5	20.1
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 NB Ramps

Inter.: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Dyer Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L	LTR	R			
Volume		1887	550		952	350	828	0	703			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru	A			
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right					EB Right	A			
SB Right					WB Right				
Green	22.3	12.1	0.0			46.1	0.0		
Yellow	4.0	4.0				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 95.1 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	2102	5074	0.94	0.41	36.5	D	28.3	C
R	1583	1583	0.37	1.00	0.1	A		
Westbound								
TR	2018	4870	0.68	0.41	23.6	C	23.6	C
Northbound								
L	858	1770	1.02	0.48	59.4	E		
LTR	903	1863	0.00	0.48	12.6	B	54.1	D
R	767	1583	0.96	0.48	47.8	D		
Southbound								

Intersection Delay = 34.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: AM
Intersection: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2015
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 NB Ramps N/S St: Dyer Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1887	550		952	350	828	0	703			
% Heavy Veh		2	2		2	2	2	2	2			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
PK 15 Vol		497	145		251	92	218	0	185			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900		1900	1900	1900			
ParkExist												
NumPark												
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L	LTR	R			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol		0			0			0				
Adj Flow		1986	579		1370		872	0	740			
%InSharedLn							0		0			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.269			0.000	1.000			
Peds Bikes	0			0			0			0		
Buses		0	0		0		0	0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0		0.0	0.0	0.0			
Arriv. Type		3	3		3		3	3	3			
Unit Ext.		3.0	3.0		3.0		3.0	3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0		2.0	2.0	2.0			
Ext of g		2.0	2.0		2.0		2.0	2.0	2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right			
Green	22.3	12.1	0.0			46.1	0.0	
Yellow	4.0	4.0				3.6		
All Red	1.0	1.0				1.0		

Cycle Length: 95.1 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1887	550		952	350	828	0	703			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
Adj flow		1986	579		1002	368	872	0	740			
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
Lane group		T	R		TR		L	LTR	R			
Adj flow		1986	579		1370		872	0	740			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.269			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		TR			L	LTR	R			
So	1900	1900		1900			1900	1900	1900			
Lanes	0 3	0 1	0	0 3	0		0 1	0 1	0 1	0	0	0
fW	1.000	1.000		1.000			1.000	1.000	1.000			
fHV	0.980	0.980		0.980			0.980	0.980	0.980			
fG	1.000	1.000		1.000			1.000	1.000	1.000			
fP	1.000	1.000		1.000			1.000	1.000	1.000			
fBB	1.000	1.000		1.000			1.000	1.000	1.000			
fA	1.000	1.000		1.000			1.000	1.000	1.000			
fLU	0.908	1.000		0.908			1.000	1.000	1.000			
fRT	1.000	0.850		0.960				1.000	0.850			
fLT	1.000			1.000			0.950	1.000				
Sec.												
fLpb	1.000			1.000			1.000	1.000				
fRpb	1.000	1.000		1.000				1.000	1.000			
S	5074	1583		4870			1770	1863	1583			
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1986	5074	#	0.39	0.41	2102	0.94
Right	R	579	1583		0.37	1.00	1583	0.37
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1370	4870		0.28	0.41	2018	0.68
Right								
Northbound								
Prot								
Perm								
Left	L	872	1770	#	0.49	0.48	858	1.02
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.48	903	0.00
Right	R	740	1583		0.47	0.48	767	0.96
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.88
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.98

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.94	0.41	26.8	1.000	2102	0.46	9.6	0.0	36.5	D	28.3	C
R	0.37	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Westbound												
TR	0.68	0.41	22.7	1.000	2018	0.25	0.9	0.0	23.6	C	23.6	C
Northbound												
L	1.02	0.48	24.5	1.000	858	0.50	34.9	0.0	59.4	E		
LTR	0.00	0.48	12.6	1.000	903	0.11	0.0	0.0	12.6	B	54.1	D
R	0.96	0.48	23.7	1.000	767	0.47	24.1	0.0	47.8	D		
Southbound												

Intersection delay = 34.6 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.1 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.1 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.1 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	27.8	26.8	0.00	0.0	0.0	36.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Westbound								
	0.0						0.0	
TR	0.0	0.00	27.8	22.7	0.00	0.0	0.0	23.6
	0.0						0.0	
Northbound								
L	0.0	0.00	24.5	24.5	0.00	3.5	0.0	59.4
LTR	0.0	0.00	24.5	12.6	0.00	0.0	0.0	12.6
R	0.0	0.00	24.5	23.7	0.00	0.0	0.0	47.8
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 34.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound	Northbound			Southbound		
LaneGroup	T	R	TR	L	LTR	R			
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0			
Flow Rate	729	579	502	872	0	740			
So	1900	1900	1900	1900	1900	1900			
No.Lanes	0 3	1	0 3 0	1	1	1	0	0	0
SL	1862	1583	1787	1770	1863	1583			
LnCapacity	771	1583	740	858	903	767			
Flow Ratio	0.4	0.4	0.3	0.5	0.0	0.5			
v/c Ratio	0.95	0.37	0.68	1.02	0.00	0.96			
Grn Ratio	0.41	1.00	0.41	0.48	0.48	0.48			
I Factor	1.000		1.000		1.000				
AT or PVG	3	3	3	3	3	3			
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00			
PF2	1.00		1.00	1.00	1.00	1.00			
Q1	18.5		10.8	23.0	0.0	18.9			
kB	0.6	0.9	0.6	0.7	0.7	0.6			
Q2	5.3	0.5	1.2	9.3	0.0	6.0			
Q Average	23.8		12.0	32.4	0.0	24.9			
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0			
Q Storage	0	0	0	0	0	0			
Q S Ratio									
70th Percentile Output:									
fB%	1.2		1.2	1.1	1.2	1.2			
BOQ	27.5		14.1	37.1	0.0	28.8			
QSRatio									
85th Percentile Output:									
fB%	1.4		1.5	1.4	1.6	1.4			
BOQ	34.2		18.0	45.4	0.0	35.7			
QSRatio									
90th Percentile Output:									
fB%	1.5		1.6	1.5	1.8	1.5			
BOQ	36.2		19.4	47.9	0.0	37.8			
QSRatio									
95th Percentile Output:									
fB%	1.7		1.8	1.6	2.1	1.7			
BOQ	39.5		21.7	51.8	0.0	41.1			
QSRatio									
98th Percentile Output:									
fB%	1.9		2.1	1.8	2.7	1.8			
BOQ	44.3		25.2	57.7	0.0	46.0			
QSRatio									

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 NB Ramps

Inter.: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Dyer Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L	LTR	R			
Volume		1103	1020		1577	1250	233	0	77			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru	A			
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right					EB Right	A			
SB Right					WB Right				
Green	24.8	32.4	0.0			13.2	0.0		
Yellow	4.0	4.0				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 85.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	3713	5074	0.31	0.73	4.0	A	2.7	A
R	1583	1583	0.68	1.00	1.2	A		
Westbound								
TR	3467	4738	0.86	0.73	10.6	B	10.6	B
Northbound								
L	275	1770	0.89	0.16	63.4	E		
LTR	289	1863	0.00	0.16	30.3	C	55.8	E
R	246	1583	0.33	0.16	32.7	C		
Southbound								

Intersection Delay = 10.0+ (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: PM
Intersection: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2015
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 NB Ramps N/S St: Dyer Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1103	1020		1577	1250	233	0	77			
% Heavy Veh		2	2		2	2	2	2	2			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
PK 15 Vol		290	268		415	329	61	0	20			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900		1900	1900	1900			
ParkExist												
NumPark												
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L	LTR	R			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol		0			0			0				
Adj Flow		1161	1074		2976		245	0	81			
%InSharedLn							0		0			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.442			0.000	1.000			
Peds Bikes	0			0			0			0		
Buses		0	0		0		0	0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0		0.0	0.0	0.0			
Arriv. Type		3	3		3		3	3	3			
Unit Ext.		3.0	3.0		3.0		3.0	3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0		2.0	2.0	2.0			
Ext of g		2.0	2.0		2.0		2.0	2.0	2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right			
Green	24.8	32.4	0.0			13.2	0.0	
Yellow	4.0	4.0				3.6		
All Red	1.0	1.0				1.0		

Cycle Length: 85.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1103	1020		1577	1250	233	0	77			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
Adj flow		1161	1074		1660	1316	245	0	81			
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
Lane group		T	R		TR		L	LTR	R			
Adj flow		1161	1074		2976		245	0	81			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.442			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		TR			L	LTR	R			
So	1900	1900		1900			1900	1900	1900			
Lanes	0 3	0 1	0	3	0		1	1	1	0	0	0
fW	1.000	1.000		1.000			1.000	1.000	1.000			
fHV	0.980	0.980		0.980			0.980	0.980	0.980			
fG	1.000	1.000		1.000			1.000	1.000	1.000			
fP	1.000	1.000		1.000			1.000	1.000	1.000			
fBB	1.000	1.000		1.000			1.000	1.000	1.000			
fA	1.000	1.000		1.000			1.000	1.000	1.000			
fLU	0.908	1.000		0.908			1.000	1.000	1.000			
fRT	1.000	0.850		0.934				1.000	0.850			
fLT	1.000			1.000			0.950	1.000				
Sec.												
fLpb	1.000			1.000			1.000	1.000				
fRpb	1.000	1.000		1.000				1.000	1.000			
S	5074	1583		4738			1770	1863	1583			
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1161	5074		0.23	0.73	3713	0.31
Right	R	1074	1583		0.68	1.00	1583	0.68
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	2976	4738	#	0.63	0.73	3467	0.86
Right								
Northbound								
Prot								
Perm								
Left	L	245	1770	#	0.14	0.16	275	0.89
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.16	289	0.00
Right	R	81	1583		0.05	0.16	246	0.33
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.77
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.86

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.31	0.73	4.0	1.000	3713	0.11	0.0	0.0	4.0	A	2.7	A
R	0.68	1.00	0.0	0.950	1583	0.25	1.2	0.0	1.2	A		
Westbound												
TR	0.86	0.73	8.2	1.000	3467	0.39	2.4	0.0	10.6	B	10.6	B
Northbound												
L	0.89	0.16	35.2	1.000	275	0.41	28.2	0.0	63.4	E		
LTR	0.00	0.16	30.3	1.000	289	0.11	0.0	0.0	30.3	C	55.8	E
R	0.33	0.16	32.0	1.000	246	0.11	0.8	0.0	32.7	C		
Southbound												

Intersection delay = 10.0+ (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 85.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 85.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	85.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	11.4	4.0	0.00	0.0	0.0	4.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.2
Westbound								
	0.0						0.0	
TR	0.0	0.00	11.4	8.2	0.00	0.0	0.0	10.6
	0.0						0.0	
Northbound								
L	0.0	0.00	35.9	35.2	0.00	0.0	0.0	63.4
LTR	0.0	0.00	35.9	30.3	0.00	0.0	0.0	30.3
R	0.0	0.00	35.9	32.0	0.00	0.0	0.0	32.7
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 10.0+ sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound	Northbound			Southbound
LaneGroup	T	R	TR	L	LTR	R	
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate	426	1074	1092	245	0	81	
So	1900	1900	1900	1900	1900	1900	
No.Lanes	0 3	1	0 3 0	1	1	1	0 0 0
SL	1862	1583	1739	1770	1863	1583	
LnCapacity	1363	1583	1272	275	289	246	
Flow Ratio	0.2	0.7	0.6	0.1	0.0	0.1	
v/c Ratio	0.31	0.68	0.86	0.89	0.00	0.33	
Grn Ratio	0.73	1.00	0.73	0.16	0.16	0.16	
I Factor	1.000		1.000		1.000		
AT or PVG	3	3	3	3	3	3	
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF2	1.00		1.00	1.00	1.00	1.00	
Q1	3.5		18.6	5.7	0.0	1.7	
kB	0.8	0.9	0.8	0.3	0.3	0.3	
Q2	0.4	1.8	4.0	1.7	0.0	0.1	
Q Average	3.9		22.6	7.4	0.0	1.8	
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage	0	0	0	0	0	0	
Q S Ratio							
70th Percentile Output:							
fB%	1.2		1.2	1.2	1.2	1.2	
BOQ	4.6		26.1	8.7	0.0	2.2	
QSRatio							
85th Percentile Output:							
fB%	1.6		1.4	1.5	1.6	1.6	
BOQ	6.0		32.5	11.3	0.0	2.9	
QSRatio							
90th Percentile Output:							
fB%	1.7		1.5	1.7	1.8	1.8	
BOQ	6.7		34.5	12.4	0.0	3.3	
QSRatio							
95th Percentile Output:							
fB%	2.0		1.7	1.9	2.1	2.0	
BOQ	7.7		37.7	14.0	0.0	3.8	
QSRatio							
98th Percentile Output:							
fB%	2.4		1.9	2.3	2.7	2.6	
BOQ	9.4		42.4	16.8	0.0	4.7	
QSRatio							

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 SB Ramps

Inter.: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Grand Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Volume				355		366		810			570	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	20.3	0.0			18.0	6.2	0.0	
Yellow	3.6				4.0	4.0		
All Red	1.0				1.0	1.9		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	599	1770	0.62	0.34	18.7	B		
							20.4	C
R	536	1583	0.72	0.34	22.0	C		
Northbound								
T	1726	3547	0.49	0.49	10.6	B	10.6	B
Southbound								
T	2469	5074	0.24	0.49	9.0	A	9.0	A

Intersection Delay = 13.5 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: AM
Intersection: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2015
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 SB Ramps N/S St: Grand Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				355		366		810			570	
% Heavy Veh				2		2		2			2	
PHF				0.95		0.95		0.95			0.95	
PK 15 Vol				93		96		213			150	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900			1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						
Adj Flow				374		385		853			600	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	
Peds Bikes	0			0								
Buses				0		0		0			0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0			0.0	
Arriv. Type				3		3		3			3	
Unit Ext.				3.0		3.0		3.0			3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0			2.0	
Ext of g				2.0		2.0		2.0			2.0	
Ped Min g		3.2			3.2							

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right				
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green		20.3	0.0			18.0	6.2	0.0	
Yellow		3.6				4.0	4.0		
All Red		1.0				1.0	1.9		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				355		366		810			570	
PHF				0.95		0.95		0.95			0.95	
Adj flow				374		385		853			600	
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
Lane group				L		R		T			T	
Adj flow				374		385		853			600	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T			T		
So			1900		1900		1900			1900		
Lanes	0	0	1	0	1	0	2	0	0	3	0	
fW			1.000		1.000		1.000			1.000		
fHV			0.980		0.980		0.980			0.980		
fG			1.000		1.000		1.000			1.000		
fP			1.000		1.000		1.000			1.000		
fBB			1.000		1.000		1.000			1.000		
fA			1.000		1.000		1.000			1.000		
fLU			1.000		1.000		0.952			0.908		
fRT					0.850		1.000			1.000		
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000			1.000		
S			1770		1583		3547			5074		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	374	1770		0.21	0.34	599	0.62
Prot								
Perm								
Thru								
Right	R	385	1583	#	0.24	0.34	536	0.72
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	853	3547	#	0.24	0.49	1726	0.49
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	600	5074		0.12	0.49	2469	0.24
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.48
Total lost time per cycle, L = 10.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.59

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor Del k	d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.62	0.34	16.7	1.000	599	0.21	2.0	0.0	18.7	B		
											20.4	C
R	0.72	0.34	17.4	1.000	536	0.28	4.6	0.0	22.0	C		
Northbound												
T	0.49	0.49	10.4	1.000	1726	0.11	0.2	0.0	10.6	B	10.6	B
Southbound												

T 0.24 0.49 9.0 1.000 2469 0.11 0.1 0.0 9.0 A 9.0 A

Intersection delay = 13.5 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.9	16.7	0.00	0.0	0.0	18.7
	0.0						0.0	
R	0.0	0.00	19.9	17.4	0.00	0.0	0.0	22.0
Northbound								
	0.0						0.0	
T	0.0	0.00	15.4	10.4	0.00	0.0	0.0	10.6
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	15.4	9.0	0.00	0.0	0.0	9.0
	0.0						0.0	

Intersection Delay 13.5 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound		Northbound	Southbound
LaneGroup		L	R	T	T
Init Queue		0.0	0.0	0.0	0.0
Flow Rate		374	385	448	220
So		1900	1900	1900	1900
No.Lanes	0 0 0	1 0 1		0 2 0	0 3 0
SL		1770	1583	1862	1862
LnCapacity		599	536	906	906
Flow Ratio		0.2	0.2	0.2	0.1
v/c Ratio		0.62	0.72	0.49	0.24
Grn Ratio		0.34	0.34	0.49	0.49
I Factor		1.000		1.000	1.000
AT or PVG		3	3	3	3
Pltn Ratio		1.00	1.00	1.00	1.00
PF2		1.00	1.00	1.00	1.00
Q1		5.2	5.6	5.0	2.1
kB		0.4	0.4	0.5	0.5
Q2		0.6	0.9	0.5	0.2
Q Average		5.9	6.5	5.5	2.3
Q Spacing		25.0	25.0	25.0	25.0
Q Storage		0	0	0	0
Q S Ratio					
70th Percentile Output:					
fB%		1.2	1.2	1.2	1.2
BOQ		7.0	7.7	6.6	2.7
QSRatio					
85th Percentile Output:					
fB%		1.5	1.5	1.5	1.6
BOQ		9.1	10.0	8.6	3.6
QSRatio					
90th Percentile Output:					
fB%		1.7	1.7	1.7	1.8
BOQ		10.0	11.0	9.4	4.0
QSRatio					
95th Percentile Output:					
fB%		1.9	1.9	1.9	2.0
BOQ		11.4	12.5	10.8	4.7
QSRatio					
98th Percentile Output:					
fB%		2.3	2.3	2.4	2.5
BOQ		13.7	15.0	13.0	5.8
QSRatio					

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 SB Ramps

Inter.: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisd:
Year : 2015
N/S St: Grand Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Volume				330		240		730			710	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	18.9	0.0			16.9	8.7	0.0	
Yellow	3.6				4.0	4.0		
All Red	1.0				1.0	1.9		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	558	1770	0.62	0.31	19.7	B		
							18.8	B
R	499	1583	0.51	0.31	17.6	B		
Northbound								
T	1809	3547	0.42	0.51	9.4	A	9.4	A
Southbound								
T	2588	5074	0.29	0.51	8.5	A	8.5	A

Intersection Delay = 11.7 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: PM
Intersection: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction:
Analysis Year:
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 SB Ramps N/S St: Grand Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				330		240		730			710	
% Heavy Veh				2		2		2			2	
PHF				0.95		0.95		0.95			0.95	
PK 15 Vol				87		63		192			187	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900			1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						
Adj Flow				347		253		768			747	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	
Peds Bikes	0			0								
Buses				0		0		0			0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0			0.0	
Arriv. Type				3		3		3			3	
Unit Ext.				3.0		3.0		3.0			3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0			2.0	
Ext of g				2.0		2.0		2.0			2.0	
Ped Min g		3.2			3.2							

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right				
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green		18.9	0.0			16.9	8.7	0.0	
Yellow		3.6				4.0	4.0		
All Red		1.0				1.0	1.9		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				330		240		730			710	
PHF				0.95		0.95		0.95			0.95	
Adj flow				347		253		768			747	
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
Lane group				L		R		T			T	
Adj flow				347		253		768			747	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T			T		
So				1900		1900	1900			1900		
Lanes	0	0	0	1	0	1	0	2	0	0	3	0
fW				1.000		1.000		1.000			1.000	
fHV				0.980		0.980		0.980			0.980	
fG				1.000		1.000		1.000			1.000	
fP				1.000		1.000		1.000			1.000	
fBB				1.000		1.000		1.000			1.000	
fA				1.000		1.000		1.000			1.000	
fLU				1.000		1.000		0.952			0.908	
fRT						0.850		1.000			1.000	
fLT				0.950				1.000			1.000	
Sec.												
fLpb				1.000				1.000			1.000	
fRpb						1.000		1.000			1.000	
S				1770		1583		3547			5074	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	347	1770	#	0.20	0.31	558	0.62
Prot								
Perm								
Thru								
Right	R	253	1583		0.16	0.31	499	0.51
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	768	3547	#	0.22	0.51	1809	0.42
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	747	5074		0.15	0.51	2588	0.29
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.41
Total lost time per cycle, L = 10.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.50

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.62	0.31	17.5	1.000	558	0.21	2.1	0.0	19.7	B		
											18.8	B
R	0.51	0.31	16.8	1.000	499	0.12	0.9	0.0	17.6	B		
Northbound												
T	0.42	0.51	9.2	1.000	1809	0.11	0.2	0.0	9.4	A	9.4	A
Southbound												

T	0.29	0.51	8.4	1.000	2588	0.11	0.1	0.0	8.5	A	8.5	A

Intersection delay = 11.7 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	20.6	17.5	0.00	0.0	0.0	19.7
	0.0						0.0	
R	0.0	0.00	20.6	16.8	0.00	0.0	0.0	17.6
Northbound								
	0.0						0.0	
T	0.0	0.00	14.7	9.2	0.00	0.0	0.0	9.4
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	14.7	8.4	0.00	0.0	0.0	8.5
	0.0						0.0	

Intersection Delay 11.7 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound		Northbound	Southbound
LaneGroup		L	R	T	T
Init Queue		0.0	0.0	0.0	0.0
Flow Rate		347	253	403	274
So		1900	1900	1900	1900
No.Lanes	0 0 0	1 0 1		0 2 0	0 3 0
SL		1770	1583	1862	1862
LnCapacity		558	499	950	950
Flow Ratio		0.2	0.2	0.2	0.1
v/c Ratio		0.62	0.51	0.42	0.29
Grn Ratio		0.31	0.31	0.51	0.51
I Factor		1.000		1.000	1.000
AT or PVG		3	3	3	3
Pltn Ratio		1.00	1.00	1.00	1.00
PF2		1.00	1.00	1.00	1.00
Q1		4.9	3.4	4.2	2.6
kB		0.4	0.4	0.5	0.5
Q2		0.6	0.4	0.4	0.2
Q Average		5.5	3.8	4.6	2.8
Q Spacing		25.0	25.0	25.0	25.0
Q Storage		0	0	0	0
Q S Ratio					
70th Percentile Output:					
fB%		1.2	1.2	1.2	1.2
BOQ		6.6	4.5	5.5	3.4
QSRatio					
85th Percentile Output:					
fB%		1.5	1.6	1.6	1.6
BOQ		8.6	5.9	7.1	4.5
QSRatio					
90th Percentile Output:					
fB%		1.7	1.7	1.7	1.7
BOQ		9.4	6.6	7.9	5.0
QSRatio					
95th Percentile Output:					
fB%		1.9	2.0	2.0	2.0
BOQ		10.8	7.5	9.0	5.7
QSRatio					
98th Percentile Output:					
fB%		2.4	2.4	2.4	2.5
BOQ		13.0	9.3	11.0	7.1
QSRatio					

Appendix I-4 **2015 Cumulative Baseline With Project HCS Intersection Worksheets**

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Volume	755		462					1178	240		2013	391
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	14.5	0.0				11.7	17.8	0.0
Yellow	3.6					3.6	4.3	
All Red	1.5					1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1165	4820	0.68	0.24	22.3	C		
							23.2	C
R	677	2803	0.72	0.24	24.6	C		
Westbound								
Northbound								
T	2926	5074	0.42	0.58	7.2	A	6.0	A
R	1583	1583	0.16	1.00	0.0+	A		
Southbound								
T	2926	5074	0.72	0.58	10.1	B	8.5	A
R	1583	1583	0.26	1.00	0.1	A		

Intersection Delay = 11.3 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Culver at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	755		462					1178	240		2013	391
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	199		122					310	63		530	103
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	795		486					1240	253		2119	412
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	14.5	0.0			11.7	17.8	0.0	
Yellow	3.6				3.6	4.3		
All Red	1.5				1.5	1.5		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	755		462					1178	240		2013	391
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	795		486					1240	253		2119	412
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
Lane group	L		R					T	R		T	R
Adj flow	795		486					1240	253		2119	412
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound	
LG	L		R				T	R		T	R
So	1900		1900				1900	1900		1900	1900
Lanes	3	0	2	0	0	0	3	1	0	3	1
fW	1.000		1.000				1.000	1.000		1.000	1.000
fHV	0.980		0.980				0.980	0.980		0.980	0.980
fG	1.000		1.000				1.000	1.000		1.000	1.000
fP	1.000		1.000				1.000	1.000		1.000	1.000
fBB	1.000		1.000				1.000	1.000		1.000	1.000
fA	1.000		1.000				1.000	1.000		1.000	1.000
fLU	0.908		0.885				0.908	1.000		0.908	1.000
fRT			0.850				1.000	0.850		1.000	0.850
fLT	0.950						1.000			1.000	
Sec.											
fLpb	1.000						1.000			1.000	
fRpb			1.000				1.000	1.000		1.000	1.000
S	4820		2803				5074	1583		5074	1583
Sec.											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	795	4820		0.16	0.24	1165	0.68
Prot								
Perm								
Thru								
Right	R	486	2803	#	0.17	0.24	677	0.72
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1240	5074		0.24	0.58	2926	0.42
Right	R	253	1583		0.16	1.00	1583	0.16
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2119	5074	#	0.42	0.58	2926	0.72
Right	R	412	1583		0.26	1.00	1583	0.26

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.59
Total lost time per cycle, L = 10.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.72

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.68	0.24	20.7	1.000	1165	0.25	1.7	0.0	22.3	C		
											23.2	C
R	0.72	0.24	20.9	1.000	677	0.28	3.7	0.0	24.6	C		
Westbound												
Northbound												
T	0.42	0.58	7.1	1.000	2926	0.11	0.1	0.0	7.2	A	6.0	A
R	0.16	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Southbound												

T	0.72	0.58	9.2	1.000	2926	0.28	0.9	0.0	10.1	B	8.5	A
R	0.26	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 11.3 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	22.7	20.7	0.00	0.0	0.0	22.3

	0.0						0.0	
R	0.0	0.00	22.7	20.9	0.00	0.0	0.0	24.6
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	12.7	7.1	0.00	0.0	0.0	7.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Southbound								
	0.0						0.0	
T	0.0	0.00	12.7	9.2	0.00	0.0	0.0	10.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 11.3 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	291	274			455	253	777	412
So	1900	1900			1900	1900	1900	1900
No.Lanes	3 0 2		0 0 0		0 3	1	0 3	1
SL	1769	1584			1862	1583	1862	1583
LnCapacity	427	382			1074	1583	1074	1583
Flow Ratio	0.2	0.2			0.2	0.2	0.4	0.3
v/c Ratio	0.68	0.72			0.42	0.16	0.72	0.26
Grn Ratio	0.24	0.24			0.58	1.00	0.58	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	4.4	4.2			4.2		9.4	
kB	0.3	0.3			0.6	0.7	0.6	0.7
Q2	0.7	0.7			0.4	0.1	1.4	0.3
Q Average	5.1	4.9			4.7		10.8	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	6.0	5.8			5.5		12.7	
QSRatio								
85th Percentile Output:								
fB%	1.6	1.6			1.6		1.5	
BOQ	7.9	7.7			7.3		16.3	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.7			1.7		1.6	
BOQ	8.7	8.4			8.0		17.7	
QSRatio								
95th Percentile Output:								
fB%	2.0	2.0			2.0		1.8	
BOQ	9.9	9.6			9.1		19.8	
QSRatio								
98th Percentile Output:								
fB%	2.4	2.4			2.4		2.1	
BOQ	12.1	11.7			11.2		23.1	
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Volume	1157		894					1833	300		1386	260
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	22.6	0.0				13.0	8.4	0.0
Yellow	3.6					3.6	4.3	
All Red	1.5					1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1816	4820	0.67	0.38	16.6	B		
							21.2	C
R	1056	2803	0.89	0.38	27.2	C		
Westbound								
Northbound								
T	2241	5074	0.86	0.44	18.8	B	16.1	B
R	1583	1583	0.20	1.00	0.1	A		
Southbound								
T	2241	5074	0.65	0.44	13.8	B	11.6	B
R	1583	1583	0.17	1.00	0.1	A		

Intersection Delay = 16.6 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Culver at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	1157		894					1833	300		1386	260
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	304		235					482	79		365	68
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	1218		941					1929	316		1459	274
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	22.6	0.0			13.0	8.4	0.0	
Yellow	3.6				3.6	4.3		
All Red	1.5				1.5	1.5		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	1157		894					1833	300		1386	260
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	1218		941					1929	316		1459	274
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
Lane group	L		R					T	R		T	R
Adj flow	1218		941					1929	316		1459	274
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound	
LG	L		R				T	R		T	R
So	1900		1900				1900	1900		1900	1900
Lanes	3	0	2	0	0	0	3	1	0	3	1
fW	1.000		1.000				1.000	1.000		1.000	1.000
fHV	0.980		0.980				0.980	0.980		0.980	0.980
fG	1.000		1.000				1.000	1.000		1.000	1.000
fP	1.000		1.000				1.000	1.000		1.000	1.000
fBB	1.000		1.000				1.000	1.000		1.000	1.000
fA	1.000		1.000				1.000	1.000		1.000	1.000
fLU	0.908		0.885				0.908	1.000		0.908	1.000
fRT			0.850				1.000	0.850		1.000	0.850
fLT	0.950						1.000			1.000	
Sec.											
fLpb	1.000						1.000			1.000	
fRpb			1.000				1.000	1.000		1.000	1.000
S	4820		2803				5074	1583		5074	1583
Sec.											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	1218	4820		0.25	0.38	1816	0.67
Prot								
Perm								
Thru								
Right	R	941	2803	#	0.34	0.38	1056	0.89
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1929	5074	#	0.38	0.44	2241	0.86
Right	R	316	1583		0.20	1.00	1583	0.20
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1459	5074		0.29	0.44	2241	0.65
Right	R	274	1583		0.17	1.00	1583	0.17

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.72
Total lost time per cycle, L = 10.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.87

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.67	0.38	15.6	1.000	1816	0.24	1.0	0.0	16.6	B		
											21.2	C
R	0.89	0.38	17.5	1.000	1056	0.42	9.7	0.0	27.2	C		
Westbound												
Northbound												
T	0.86	0.44	15.1	1.000	2241	0.39	3.7	0.0	18.8	B	16.1	B
R	0.20	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.65	0.44	13.1	1.000	2241	0.23	0.7	0.0	13.8	B	11.6	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 16.6 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	18.7	15.6	0.00	0.0	0.0	16.6

	0.0						0.0	
R	0.0	0.00	18.7	17.5	0.00	0.0	0.0	27.2
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	16.7	15.1	0.00	0.0	0.0	18.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	16.7	13.1	0.00	0.0	0.0	13.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 16.6 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	447	531			708	316	535	274
So	1900	1900			1900	1900	1900	1900
No.Lanes	3 0	2	0 0	0	3	1	3	1
SL	1769	1584			1862	1583	1862	1583
LnCapacity	666	596			822	1583	822	1583
Flow Ratio	0.3	0.3			0.4	0.2	0.3	0.2
v/c Ratio	0.67	0.89			0.86	0.20	0.65	0.17
Grn Ratio	0.38	0.38			0.44	1.00	0.44	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	6.2	8.3			10.6		7.0	
kB	0.4	0.4			0.5	0.7	0.5	0.7
Q2	0.8	2.5			2.5	0.2	0.9	0.1
Q Average	7.1	10.8			13.2		7.9	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	8.4	12.7			15.4		9.3	
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5			1.5		1.5	
BOQ	10.8	16.3			19.7		12.0	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.6			1.6		1.7	
BOQ	11.9	17.6			21.2		13.1	
QSRatio								
95th Percentile Output:								
fB%	1.9	1.8			1.8		1.9	
BOQ	13.4	19.7			23.6		14.8	
QSRatio								
98th Percentile Output:								
fB%	2.3	2.1			2.1		2.2	
BOQ	16.1	23.0			27.2		17.7	
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 NB Ramps

Inter.: Jamboree at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Volume				984	0	504		1204	690		1785	484	
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol						0			0			0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left	A				SB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	36.1	0.0				7.1	6.6	0.0	
Yellow	3.6					4.3	4.3		
All Red	1.0					1.0	1.0		

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	983	1770	1.05	0.56	58.4	E		
LTR	1035	1863	0.00	0.56	6.4	A	42.3	D
R	879	1583	0.60	0.56	10.9	B		
Northbound								
T	1977	6765	0.64	0.29	20.7	C	13.3	B
R	1583	1583	0.46	1.00	0.2	A		
Southbound								
T	1977	6765	0.95	0.29	33.4	C	26.3	C
R	1583	1583	0.32	1.00	0.1	A		

Intersection Delay = 26.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Jamboree at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				984	0	504		1204	690		1785	484
% Heavy Veh				2	2	2		2	2		2	2
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
PK 15 Vol				259	0	133		317	182		470	127
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0		12.0	12.0
RTOR Vol						0				0			0
Adj Flow				1036	0	531			1267	726		1879	509
%InSharedLn				0		0							
Prop LTs					0.000				0.000			0.000	
Prop RTs					0.000	1.000			0.000	1.000		0.000	1.000
Peds Bikes	0				0				0			0	
Buses				0	0	0			0	0		0	0
%InProtPhase													

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0			0.0	0.0		0.0	0.0
Arriv. Type				3	3	3			3	3		3	3
Unit Ext.				3.0	3.0	3.0			3.0	3.0		3.0	3.0
I Factor					1.000				1.000			1.000	
Lost Time				2.0	2.0	2.0			2.0	2.0		2.0	2.0
Ext of g				2.0	2.0	2.0			2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2				3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		36.1	0.0			7.1	6.6	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				984	0	504		1204	690		1785	484
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
Adj flow				1036	0	531		1267	726		1879	509
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
Lane group				L		LTR	R		T	R		T	R
Adj flow				1036	0	531			1267	726		1879	509
Prop LTs					0.000				0.000			0.000	
Prop RTs					0.000	1.000			0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L	LTR	R		T	R		T	R	
So			1900	1900	1900		1900	1900		1900	1900	
Lanes	0	0	1	1	1	0	4	1	0	4	1	
fW			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fHV			0.980	0.980	0.980		0.980	0.980		0.980	0.980	
fG			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fP			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fBB			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fA			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fLU			1.000	1.000	1.000		0.908	1.000		0.908	1.000	
fRT				1.000	0.850		1.000	0.850		1.000	0.850	
fLT			0.950	1.000			1.000			1.000		
Sec.												
fLpb			1.000	1.000			1.000			1.000		
fRpb				1.000	1.000		1.000	1.000		1.000	1.000	
S			1770	1863	1583		6765	1583		6765	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	1036	1770	#	0.59	0.56	983	1.05
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.56	1035	0.00
Right	R	531	1583		0.34	0.56	879	0.60
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1267	6765		0.19	0.29	1977	0.64
Right	R	726	1583		0.46	1.00	1583	0.46
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1879	6765	#	0.28	0.29	1977	0.95
Right	R	509	1583		0.32	1.00	1583	0.32

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.86
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.02

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.05	0.56	14.4	1.000	983	0.50	44.0	0.0	58.4	E		
LTR	0.00	0.56	6.4	1.000	1035	0.11	0.0	0.0	6.4	A	42.3	D
R	0.60	0.56	9.7	1.000	879	0.19	1.2	0.0	10.9	B		
Northbound												
T	0.64	0.29	20.0	1.000	1977	0.22	0.7	0.0	20.7	C	13.3	B
R	0.46	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.95	0.29	22.5	1.000	1977	0.46	10.8	0.0	33.4	C	26.3	C
R	0.32	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 26.1 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	65.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	65.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	14.4	14.4	0.00	13.2	0.0	58.4
LTR	0.0	0.00	14.4	6.4	0.00	0.0	0.0	6.4
R	0.0	0.00	14.4	9.7	0.00	0.0	0.0	10.9
Northbound								
	0.0						0.0	
T	0.0	0.00	23.0	20.0	0.00	0.0	0.0	20.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	23.0	22.5	0.00	0.0	0.0	33.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 26.1 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup				L	LTR	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				1036	0	531	348	726	517	509
So				1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	1	1	1	4	1	4	1
SL				1770	1863	1583	1862	1583	1862	1583
LnCapacity				983	1035	879	544	1583	544	1583
Flow Ratio				0.6	0.0	0.3	0.2	0.5	0.3	0.3
v/c Ratio				1.05	0.00	0.60	0.64	0.46	0.95	0.32
Grn Ratio				0.56	0.56	0.56	0.29	1.00	0.29	1.00
I Factor					1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00	1.00		1.00	
Q1				18.7	0.0	6.4	5.5		9.1	
kB				0.6	0.6	0.5	0.4	0.7	0.4	0.7
Q2				12.5	0.0	0.8	0.7	0.6	3.6	0.4
Q Average				31.2	0.0	7.2	6.1		12.8	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%				1.1	1.2	1.2	1.2		1.2	
BOQ				35.7	0.0	8.5	7.3		15.0	
QSRatio										
85th Percentile Output:										
fB%				1.4	1.6	1.5	1.5		1.5	
BOQ				43.8	0.0	11.1	9.5		19.1	
QSRatio										
90th Percentile Output:										
fB%				1.5	1.8	1.7	1.7		1.6	
BOQ				46.3	0.0	12.1	10.4		20.6	
QSRatio										
95th Percentile Output:										
fB%				1.6	2.1	1.9	1.9		1.8	
BOQ				50.1	0.0	13.7	11.8		22.9	
QSRatio										
98th Percentile Output:										
fB%				1.8	2.7	2.3	2.3		2.1	
BOQ				55.8	0.0	16.4	14.3		26.5	
QSRatio										

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 NB Ramps

Inter.: Jamboree at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Volume				357	0	974		2576	690		1513	480
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	45.7	0.0				24.0	10.1	0.0
Yellow	3.6					4.3	4.3	
All Red	1.0					1.0	1.0	

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	851	1770	0.44	0.48	16.6	B		
LTR	896	1863	0.00	0.48	12.8	B	142.5	F
R	762	1583	1.35	0.48	188.7	F		
Northbound								
T	2806	6765	0.97	0.41	37.5	D	29.7	C
R	1583	1583	0.46	1.00	0.2	A		
Southbound								
T	2806	6765	0.57	0.41	21.6	C	16.4	B
R	1583	1583	0.32	1.00	0.1	A		

Intersection Delay = 48.4 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Jamboree at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				357	0	974		2576	690		1513	480
% Heavy Veh				2	2	2		2	2		2	2
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
PK 15 Vol				94	0	256		678	182		398	126
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0		12.0	12.0
RTOR Vol						0				0			0
Adj Flow				376	0	1025		2712	726		1593	505
%InSharedLn				0		0						
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0		0.0	0.0
Arriv. Type				3	3	3		3	3		3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		45.7	0.0			24.0	10.1	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				357	0	974		2576	690		1513	480
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
Adj flow				376	0	1025		2712	726		1593	505
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
Lane group				L		LTR	R		T	R		T	R
Adj flow				376	0	1025		2712	726		1593	505
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L	LTR	R		T	R		T	R	
So			1900	1900	1900		1900	1900		1900	1900	
Lanes	0	0	1	1	1	0	4	1	0	4	1	
fW			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fHV			0.980	0.980	0.980		0.980	0.980		0.980	0.980	
fG			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fP			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fBB			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fA			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fLU			1.000	1.000	1.000		0.908	1.000		0.908	1.000	
fRT				1.000	0.850		1.000	0.850		1.000	0.850	
fLT			0.950	1.000			1.000			1.000		
Sec.												
fLpb			1.000	1.000			1.000			1.000		
fRpb				1.000	1.000		1.000	1.000		1.000	1.000	
S			1770	1863	1583		6765	1583		6765	1583	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	376	1770		0.21	0.48	851	0.44
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.48	896	0.00
Right	R	1025	1583	#	0.65	0.48	762	1.35
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2712	6765	#	0.40	0.41	2806	0.97
Right	R	726	1583		0.46	1.00	1583	0.46
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1593	6765		0.24	0.41	2806	0.57
Right	R	505	1583		0.32	1.00	1583	0.32

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.05
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.17

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.44	0.48	16.2	1.000	851	0.11	0.4	0.0	16.6	B		
LTR	0.00	0.48	12.8	1.000	896	0.11	0.0	0.0	12.8	B	142.5	F
R	1.35	0.48	24.7	1.000	762	0.50	164.0	0.0	188.7	F		
Northbound												
T	0.97	0.41	27.2	1.000	2806	0.47	10.4	0.0	37.5	D	29.7	C
R	0.46	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.57	0.41	21.3	1.000	2806	0.16	0.3	0.0	21.6	C	16.4	B
R	0.32	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 48.4 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	24.7	16.2	0.00	0.0	0.0	16.6
LTR	0.0	0.00	24.7	12.8	0.00	0.0	0.0	12.8
R	0.0	0.00	24.7	24.7	0.00	65.8	0.0	188.7
Northbound								
	0.0						0.0	
T	0.0	0.00	27.8	27.2	0.00	0.0	0.0	37.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	27.8	21.3	0.00	0.0	0.0	21.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 48.4 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup				L	LTR	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				376	0	1025	746	726	438	505
So				1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	1	1	1	4	1	4	1
SL				1770	1863	1583	1862	1583	1862	1583
LnCapacity				851	896	762	772	1583	772	1583
Flow Ratio				0.2	0.0	0.6	0.4	0.5	0.2	0.3
v/c Ratio				0.44	0.00	1.35	0.97	0.46	0.57	0.32
Grn Ratio				0.48	0.48	0.48	0.41	1.00	0.41	1.00
I Factor					1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00	1.00		1.00	
Q1				6.5	0.0	27.0	19.2		8.8	
kB				0.6	0.7	0.6	0.6	0.9	0.6	0.9
Q2				0.5	0.0	35.1	6.1	0.8	0.8	0.4
Q Average				7.0	0.0	62.1	25.3		9.6	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%				1.2	1.2	1.1	1.2		1.2	
BOQ				8.3	0.0	69.7	29.2		11.4	
QSRatio										
85th Percentile Output:										
fB%				1.5	1.6	1.3	1.4		1.5	
BOQ				10.8	0.0	83.1	36.2		14.6	
QSRatio										
90th Percentile Output:										
fB%				1.7	1.8	1.4	1.5		1.6	
BOQ				11.8	0.0	88.1	38.3		15.9	
QSRatio										
95th Percentile Output:										
fB%				1.9	2.1	1.5	1.6		1.9	
BOQ				13.4	0.0	94.4	41.7		17.8	
QSRatio										
98th Percentile Output:										
fB%				2.3	2.7	1.7	1.8		2.2	
BOQ				16.1	0.0	106	46.7		21.0	
QSRatio										

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Volume	453		1008					1427	450		2012	540
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	24.1	0.0				11.3	9.4	0.0	
Yellow	3.6					4.3	4.3		
All Red	1.0					1.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1381	3437	0.35	0.40	12.6	B		
							26.2	C
R	1126	2803	0.94	0.40	32.3	C		
Westbound								
Northbound								
T	2932	6765	0.51	0.43	12.5	B	9.6	A
R	1583	1583	0.30	1.00	0.1	A		
Southbound								
T	2932	6765	0.72	0.43	14.9	B	11.8	B
R	1583	1583	0.36	1.00	0.1	A		

Intersection Delay = 14.7 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Jamboree at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	453		1008					1427	450		2012	540
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	119		265					376	118		529	142
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	477		1061					1502	474		2118	568
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	24.1	0.0			11.3	9.4	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	453		1008					1427	450		2012	540
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	477		1061					1502	474		2118	568
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
Lane group	L		R					T	R		T	R
Adj flow	477		1061					1502	474		2118	568
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound					Westbound					Northbound			Southbound	
LG	L		R								T	R		T	R
So	1900		1900								1900	1900		1900	1900
Lanes	2	0	2	0	0	0	0				4	1	0	4	1
fW	1.000		1.000								1.000	1.000		1.000	1.000
fHV	0.980		0.980								0.980	0.980		0.980	0.980
fG	1.000		1.000								1.000	1.000		1.000	1.000
fP	1.000		1.000								1.000	1.000		1.000	1.000
fBB	1.000		1.000								1.000	1.000		1.000	1.000
fA	1.000		1.000								1.000	1.000		1.000	1.000
fLU	0.971		0.885								0.908	1.000		0.908	1.000
fRT			0.850								1.000	0.850		1.000	0.850
fLT	0.950										1.000			1.000	
Sec.															
fLpb	1.000										1.000			1.000	
fRpb			1.000								1.000	1.000		1.000	1.000
S	3437		2803								6765	1583		6765	1583
Sec.															

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	477	3437		0.14	0.40	1381	0.35
Prot								
Perm								
Thru								
Right	R	1061	2803	#	0.38	0.40	1126	0.94
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1502	6765		0.22	0.43	2932	0.51
Right	R	474	1583		0.30	1.00	1583	0.30
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2118	6765	#	0.31	0.43	2932	0.72
Right	R	568	1583		0.36	1.00	1583	0.36

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.69
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.83

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.35	0.40	12.5	1.000	1381	0.11	0.2	0.0	12.6	B		
											26.2	C
R	0.94	0.40	17.3	1.000	1126	0.45	15.0	0.0	32.3	C		
Westbound												
Northbound												
T	0.51	0.43	12.4	1.000	2932	0.12	0.2	0.0	12.5	B	9.6	A
R	0.30	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.72	0.43	14.0	1.000	2932	0.28	0.9	0.0	14.9	B	11.8	B
R	0.36	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 14.7 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT				0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	17.9	12.5	0.00	0.0	0.0	12.6

	0.0						0.0	
R	0.0	0.00	17.9	17.3	0.00	0.0	0.0	32.3
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	17.0	12.4	0.00	0.0	0.0	12.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	17.0	14.0	0.00	0.0	0.0	14.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 14.7 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	245	599			413	474	583	568
So	1900	1900			1900	1900	1900	1900
No.Lanes	2 0 2		0 0 0		0 4	1	0 4	1
SL	1770	1584			1862	1583	1862	1583
LnCapacity	711	636			807	1583	807	1583
Flow Ratio	0.1	0.4			0.2	0.3	0.3	0.4
v/c Ratio	0.34	0.94			0.51	0.30	0.72	0.36
Grn Ratio	0.40	0.40			0.43	1.00	0.43	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	2.8	9.6			5.0		8.0	
kB	0.4	0.4			0.5	0.7	0.5	0.7
Q2	0.2	3.7			0.5	0.3	1.2	0.4
Q Average	3.1	13.3			5.5		9.2	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	3.7	15.6			6.5		10.9	
QSRatio								
85th Percentile Output:								
fB%	1.6	1.5			1.5		1.5	
BOQ	4.8	19.9			8.5		14.0	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.6			1.7		1.7	
BOQ	5.3	21.4			9.4		15.2	
QSRatio								
95th Percentile Output:								
fB%	2.0	1.8			1.9		1.9	
BOQ	6.2	23.8			10.7		17.1	
QSRatio								
98th Percentile Output:								
fB%	2.5	2.1			2.4		2.2	
BOQ	7.6	27.4			13.0		20.2	
QSRatio								

HCS+: Signalized Intersections Release 5.4

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Inter.: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Volume	730		772					2490	1120		1458	430
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	20.0	0.0				9.8	15.0	0.0	
Yellow	3.6					4.3	4.3		
All Red	1.0					1.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1146	3437	0.67	0.33	18.7	B		
							23.3	C
R	934	2803	0.87	0.33	27.7	C		
Westbound								
Northbound								
T	3394	6765	0.77	0.50	13.3	B	9.8	A
R	1583	1583	0.74	1.00	2.0	A		
Southbound								
T	3394	6765	0.45	0.50	9.7	A	7.5	A
R	1583	1583	0.29	1.00	0.1	A		

Intersection Delay = 12.1 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: PM
Intersection: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2015
Project ID: IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	730		772					2490	1120		1458	430
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	192		203					655	295		384	113
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	768		813					2621	1179		1535	453
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	20.0	0.0			9.8	15.0	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	730		772					2490	1120		1458	430
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	768		813					2621	1179		1535	453
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
Lane group	L		R					T	R		T	R
Adj flow	768		813					2621	1179		1535	453
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound					Westbound					Northbound			Southbound	
LG	L		R								T	R		T	R
So	1900		1900								1900	1900		1900	1900
Lanes	2	0	2	0	0	0	0				4	1	0	4	1
fW	1.000		1.000								1.000	1.000		1.000	1.000
fHV	0.980		0.980								0.980	0.980		0.980	0.980
fG	1.000		1.000								1.000	1.000		1.000	1.000
fP	1.000		1.000								1.000	1.000		1.000	1.000
fBB	1.000		1.000								1.000	1.000		1.000	1.000
fA	1.000		1.000								1.000	1.000		1.000	1.000
fLU	0.971		0.885								0.908	1.000		0.908	1.000
fRT			0.850								1.000	0.850		1.000	0.850
fLT	0.950										1.000			1.000	
Sec.															
fLpb	1.000										1.000			1.000	
fRpb			1.000								1.000	1.000		1.000	1.000
S	3437		2803								6765	1583		6765	1583
Sec.															

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	768	3437		0.22	0.33	1146	0.67
Prot								
Perm								
Thru								
Right	R	813	2803		0.29	0.33	934	0.87
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2621	6765		0.39	0.50	3394	0.77
Right	R	1179	1583	#	0.74	1.00	1583	0.74
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1535	6765		0.23	0.50	3394	0.45
Right	R	453	1583		0.29	1.00	1583	0.29

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.74
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.74

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.67	0.33	17.2	1.000	1146	0.24	1.5	0.0	18.7	B		
											23.3	C
R	0.87	0.33	18.8	1.000	934	0.40	9.0	0.0	27.7	C		
Westbound												
Northbound												
T	0.77	0.50	12.2	1.000	3394	0.32	1.1	0.0	13.3	B	9.8	A
R	0.74	1.00	0.0	0.950	1583	0.30	2.0	0.0	2.0	A		
Southbound												

T	0.45	0.50	9.6	1.000	3394	0.11	0.1	0.0	9.7	A	7.5	A
R	0.29	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 12.1 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	20.0	17.2	0.00	0.0	0.0	18.7

	0.0						0.0	
R	0.0	0.00	20.0	18.8	0.00	0.0	0.0	27.7
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	14.9	12.2	0.00	0.0	0.0	13.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.0
Southbound								
	0.0						0.0	
T	0.0	0.00	14.9	9.6	0.00	0.0	0.0	9.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 12.1 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	395	459			721	1179	422	453
So	1900	1900			1900	1900	1900	1900
No.Lanes	2 0 2		0 0 0		0 4	1	0 4	1
SL	1770	1584			1862	1583	1862	1583
LnCapacity	590	527			934	1583	934	1583
Flow Ratio	0.2	0.3			0.4	0.7	0.2	0.3
v/c Ratio	0.67	0.87			0.77	0.74	0.45	0.29
Grn Ratio	0.33	0.33			0.50	1.00	0.50	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	5.6	7.2			9.8		4.5	
kB	0.4	0.4			0.5	0.7	0.5	0.7
Q2	0.8	2.0			1.7	2.0	0.4	0.3
Q Average	6.4	9.2			11.4		5.0	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	7.6	10.8			13.4		5.9	
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5			1.5		1.6	
BOQ	9.9	14.0			17.2		7.7	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.7			1.6		1.7	
BOQ	10.9	15.2			18.6		8.5	
QSRatio								
95th Percentile Output:								
fB%	1.9	1.9			1.8		2.0	
BOQ	12.3	17.1			20.8		9.7	
QSRatio								
98th Percentile Output:								
fB%	2.3	2.2			2.1		2.4	
BOQ	14.8	20.2			24.2		11.8	
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 NB Ramps

Inter.: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	151	0	300				315	1039			2630	55
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0								0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right	A				WB Right				
Green	19.1	0.0				11.5	42.6	20.9	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 115.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	294	1770	0.54	0.17	46.0	D		
LTR	309	1863	0.00	0.17	40.0	D	127.9	F
R	263	1583	1.20	0.17	169.2	F		
Westbound								
Northbound								
L	344	3437	0.97	0.10	90.7	F		
T	3750	5074	0.29	0.74	5.0	A	25.0	C
Southbound								
T	3058	5074	0.91	0.60	24.3	C	23.8	C
R	1583	1583	0.04	1.00	0.0+	A		

Intersection Delay = 34.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Tustin Ranch at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 NB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	151	0	300				315	1039			2630	55
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	40	0	79				83	273			692	14
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	159	0	316				332	1094			2768	58
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru	A	A	A
Right		A			Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right		A			WB Right			
Green		19.1	0.0			11.5	42.6	20.9	0.0
Yellow		3.6				3.2	4.3	4.3	
All Red		1.5				1.0	1.5	1.5	

Cycle Length: 115.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	151	0	300				315	1039			2630	55
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	159	0	316				332	1094			2768	58
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	159	0	316				332	1094			2768	58
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	159	1770		0.09	0.17	294	0.54
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.17	309	0.00
Right	R	316	1583	#	0.20	0.17	263	1.20
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	332	3437	#	0.10	0.10	344	0.97
Prot								
Perm								
Thru	T	1094	5074		0.22	0.74	3750	0.29
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2768	5074	#	0.55	0.60	3058	0.91
Right	R	58	1583		0.04	1.00	1583	0.04

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.84
Total lost time per cycle, L = 15.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.97

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.54	0.17	43.9	1.000	294	0.14	2.0	0.0	46.0	D		
LTR	0.00	0.17	40.0	1.000	309	0.11	0.0	0.0	40.0	D	127.9	F
R	1.20	0.17	48.0	1.000	263	0.50	121.2	0.0	169.2	F		
Westbound												
Northbound												
L	0.97	0.10	51.6	1.000	344	0.47	39.2	0.0	90.7	F		
T	0.29	0.74	5.0	1.000	3750	0.11	0.0	0.0	5.0	A	25.0	C
Southbound												

T	0.91	0.60	20.0	1.000	3058	0.43	4.3	0.0	24.3	C	23.8	C
R	0.04	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		

Intersection delay = 34.6 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	115.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	115.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	115.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	48.0	43.9	0.00	0.0	0.0	46.0

LTR	0.0	0.00	48.0	40.0	0.00	0.0	0.0	40.0
R	0.0	0.00	48.0	48.0	0.00	13.3	0.0	169.2
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	51.8	51.6	0.00	0.0	0.0	90.7
T	0.0	0.00	15.0	5.0	0.00	0.0	0.0	5.0
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	22.9	20.0	0.00	0.0	0.0	24.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+

Intersection Delay 34.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	159	0	316				170	401		1016	58	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	294	309	263				177	1376		1122	1583	
Flow Ratio	0.1	0.0	0.2				0.1	0.2		0.5	0.0	
v/c Ratio	0.54	0.00	1.20				0.96	0.29		0.91	0.04	
Grn Ratio	0.17	0.17	0.17				0.10	0.74		0.60	1.00	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00		
Q1	4.7	0.0	10.1				5.4	4.3		28.4		
kB	0.4	0.4	0.4				0.3	1.0		0.9	1.1	
Q2	0.4	0.0	8.3				2.1	0.4		5.7	0.0	
Q Average	5.1	0.0	18.4				7.5	4.7		34.1		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.1		
BOQ	6.1	0.0	21.4				8.8	5.5		39.0		
QSRatio												
85th Percentile Output:												
fB%	1.6	1.6	1.5				1.5	1.6		1.4		
BOQ	7.9	0.0	26.9				11.4	7.2		47.6		
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8	1.6				1.7	1.7		1.5		
BOQ	8.7	0.0	28.7				12.5	8.0		50.2		
QSRatio												
95th Percentile Output:												
fB%	2.0	2.1	1.7				1.9	2.0		1.6		
BOQ	9.9	0.0	31.6				14.1	9.1		54.3		
QSRatio												
98th Percentile Output:												
fB%	2.4	2.7	1.9				2.3	2.4		1.8		
BOQ	12.1	0.0	35.8				16.9	11.2		60.5		
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 NB Ramps

Inter.: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	338	0	237				621	1882			1073	499
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0								0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right	A				WB Right				
Green	14.3	0.0				14.1	6.2	4.5	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	422	1770	0.84	0.24	36.2	D		
LTR	444	1863	0.00	0.24	17.4	B	31.6	C
R	377	1583	0.66	0.24	24.9	C		
Westbound								
Northbound								
L	808	3437	0.81	0.23	27.9	C		
T	2943	5074	0.67	0.58	9.3	A	13.9	B
Southbound								
T	1395	5074	0.81	0.28	24.0	C	16.4	B
R	1583	1583	0.33	1.00	0.1	A		

Intersection Delay = 16.9 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Tustin Ranch at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 NB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	338	0	237				621	1882			1073	499
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	89	0	62				163	495			282	131
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	356	0	249				654	1981			1129	525
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru	A	A	A
Right		A			Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right		A			WB Right			
Green		14.3	0.0			14.1	6.2	4.5	0.0
Yellow		3.6				3.2	4.3	4.3	
All Red		1.5				1.0	1.5	1.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	338	0	237				621	1882			1073	499
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	356	0	249				654	1981			1129	525
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	356	0	249				654	1981			1129	525
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	356	1770	#	0.20	0.24	422	0.84
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.24	444	0.00
Right	R	249	1583		0.16	0.24	377	0.66
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	654	3437	#	0.19	0.23	808	0.81
Prot								
Perm								
Thru	T	1981	5074		0.39	0.58	2943	0.67
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1129	5074	#	0.22	0.28	1395	0.81
Right	R	525	1583		0.33	1.00	1583	0.33

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.61
Total lost time per cycle, L = 15.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.82

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.84	0.24	21.8	1.000	422	0.38	14.4	0.0	36.2	D		
LTR	0.00	0.24	17.4	1.000	444	0.11	0.0	0.0	17.4	B	31.6	C
R	0.66	0.24	20.7	1.000	377	0.24	4.3	0.0	24.9	C		
Westbound												
Northbound												
L	0.81	0.23	21.7	1.000	808	0.35	6.2	0.0	27.9	C		
T	0.67	0.58	8.7	1.000	2943	0.25	0.6	0.0	9.3	A	13.9	B
Southbound												

T	0.81	0.28	20.3	1.000	1395	0.35	3.7	0.0	24.0	C	16.4	B
R	0.33	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 16.9 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	22.9	21.8	0.00	0.0	0.0	36.2

LTR	0.0	0.00	22.9	17.4	0.00	0.0	0.0	17.4
R	0.0	0.00	22.9	20.7	0.00	0.0	0.0	24.9
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	23.0	21.7	0.00	0.0	0.0	27.9
T	0.0	0.00	12.6	8.7	0.00	0.0	0.0	9.3
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	21.8	20.3	0.00	0.0	0.0	24.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 16.9 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	356	0	249				336	727		414	525	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	0	3	1
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	422	444	377				416	1080		512	1583	
Flow Ratio	0.2	0.0	0.2				0.2	0.4		0.2	0.3	
v/c Ratio	0.84	0.00	0.66				0.81	0.67		0.81	0.33	
Grn Ratio	0.24	0.24	0.24				0.23	0.58		0.28	1.00	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00		
Q1	5.7	0.0	3.8				5.3	8.3		6.4		
kB	0.3	0.3	0.3				0.3	0.6		0.4	0.7	
Q2	1.5	0.0	0.6				1.2	1.1		1.4	0.4	
Q Average	7.1	0.0	4.3				6.5	9.5		7.8		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.2		
BOQ	8.4	0.0	5.1				7.7	11.2		9.2		
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6	1.6				1.5	1.5		1.5		
BOQ	11.0	0.0	6.7				10.0	14.4		12.0		
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8	1.7				1.7	1.6		1.7		
BOQ	12.0	0.0	7.4				11.0	15.6		13.0		
QSRatio												
95th Percentile Output:												
fB%	1.9	2.1	2.0				1.9	1.9		1.9		
BOQ	13.6	0.0	8.5				12.4	17.6		14.7		
QSRatio												
98th Percentile Output:												
fB%	2.3	2.7	2.4				2.3	2.2		2.2		
BOQ	16.2	0.0	10.4				15.0	20.7		17.6		
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	755	0	874				159	1008			2382	552
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0								0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	51.3	0.0				5.3	29.6	26.3	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 129.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	699	1770	1.14	0.39	117.9	F		
LTR	736	1863	0.00	0.39	23.8	C	194.3	F
R	625	1583	1.47	0.39	260.3	F		
Westbound								
Northbound								
L	140	3437	1.19	0.04	199.4	F		
T	2723	5074	0.39	0.54	17.7	B	42.4	D
Southbound								
T	2371	5074	1.06	0.47	70.5	E	63.7	E
R	740	1583	0.79	0.47	34.7	C		

Intersection Delay = 96.5 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Tustin Ranch at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	755	0	874				159	1008			2382	552
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.92	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	199	0	230				42	265			627	145
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	795	0	920				167	1061			2507	581
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	51.3	0.0				5.3	29.6	26.3	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 129.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	755	0	874				159	1008			2382	552
PHF	0.95	0.92	0.95				0.95	0.95			0.95	0.95
Adj flow	795	0	920				167	1061			2507	581
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	795	0	920				167	1061			2507	581
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	795	1770		0.45	0.39	699	1.14
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.39	736	0.00
Right	R	920	1583	#	0.58	0.39	625	1.47
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	167	3437	#	0.05	0.04	140	1.19
Prot								
Perm								
Thru	T	1061	5074		0.21	0.54	2723	0.39
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2507	5074	#	0.49	0.47	2371	1.06
Right	R	581	1583		0.37	0.47	740	0.79

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.12
Total lost time per cycle, L = 12.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.24

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.14	0.39	39.3	1.000	699	0.50	78.6	0.0	117.9	F		
LTR	0.00	0.39	23.8	1.000	736	0.11	0.0	0.0	23.8	C	194.3	F
R	1.47	0.39	39.3	1.000	625	0.50	221.0	0.0	260.3	F		
Westbound												
Northbound												
L	1.19	0.04	62.3	1.000	140	0.50	137.1	0.0	199.4	F		
T	0.39	0.54	17.6	1.000	2723	0.11	0.1	0.0	17.7	B	42.4	D
Southbound												

T	1.06	0.47	34.6	1.000	2371	0.50	35.9	0.0	70.5	E	63.7 E
R	0.79	0.47	29.1	1.000	740	0.33	5.6	0.0	34.7	C	

Intersection delay = 96.5 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 129.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 129.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	129.9 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	39.3	39.3	0.00	24.0	0.0	117.9

LTR	0.0	0.00	39.3	23.8	0.00	0.0	0.0	23.8
R	0.0	0.00	39.3	39.3	0.00	73.8	0.0	260.3
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	62.3	62.3	0.00	6.8	0.0	199.4
T	0.0	0.00	30.1	17.6	0.00	0.0	0.0	17.7
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	34.6	34.6	0.00	34.0	0.0	70.5
R	0.0	0.00	34.6	29.1	0.00	0.0	0.0	34.7

Intersection Delay 96.5 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	795	0	920				85	389		920	581	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	0	3	1
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	699	736	625				72	999		870	740	
Flow Ratio	0.4	0.0	0.6				0.0	0.2		0.5	0.4	
v/c Ratio	1.14	0.00	1.47				1.18	0.39		1.06	0.79	
Grn Ratio	0.39	0.39	0.39				0.04	0.54		0.47	0.47	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
Q1	28.7	0.0	33.2				3.1	8.2		33.2	17.6	
kB	0.7	0.7	0.6				0.2	0.9		0.8	0.7	
Q2	16.2	0.0	38.8				2.4	0.5		13.2	2.3	
Q Average	44.9	0.0	72.0				5.5	8.8		46.4	20.0	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.1				1.2	1.2		1.1	1.2	
BOQ	50.9	0.0	80.4				6.5	10.3		52.4	23.2	
QSRatio												
85th Percentile Output:												
fB%	1.4	1.6	1.3				1.5	1.5		1.4	1.5	
BOQ	61.4	0.0	95.6				8.5	13.4		63.2	29.1	
QSRatio												
90th Percentile Output:												
fB%	1.4	1.8	1.4				1.7	1.7		1.4	1.5	
BOQ	64.8	0.0	102				9.3	14.5		66.7	30.9	
QSRatio												
95th Percentile Output:												
fB%	1.5	2.1	1.5				1.9	1.9		1.5	1.7	
BOQ	69.6	0.0	109				10.6	16.4		71.7	33.9	
QSRatio												
98th Percentile Output:												
fB%	1.7	2.7	1.7				2.4	2.2		1.7	1.9	
BOQ	77.8	0.0	123				12.9	19.4		80.1	38.3	
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	666	0	414				168	1907			1021	303
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0								0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	29.1	0.0				5.3	12.8	5.4	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 70.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	736	1770	0.95	0.42	42.0	D		
LTR	774	1863	0.00	0.42	11.9	B	33.2	C
R	658	1583	0.66	0.42	19.0	B		
Westbound								
Northbound								
L	260	3437	0.68	0.08	38.6	D		
T	2320	5074	0.87	0.46	20.8	C	22.2	C
Southbound								
T	1667	5074	0.64	0.33	20.9	C	21.1	C
R	520	1583	0.61	0.33	21.9	C		

Intersection Delay = 24.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Tustin Ranch at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	666	0	414				168	1907			1021	303
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	175	0	109				44	502			269	80
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	701	0	436				177	2007			1075	319
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	29.1	0.0				5.3	12.8	5.4	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 70.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	666	0	414				168	1907			1021	303
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	701	0	436				177	2007			1075	319
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	701	0	436				177	2007			1075	319
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	701	1770	#	0.40	0.42	736	0.95
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.42	774	0.00
Right	R	436	1583		0.28	0.42	658	0.66
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	177	3437		0.05	0.08	260	0.68
Prot								
Perm								
Thru	T	2007	5074	#	0.40	0.46	2320	0.87
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1075	5074		0.21	0.33	1667	0.64
Right	R	319	1583		0.20	0.33	520	0.61

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.79
Total lost time per cycle, L = 8.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.91

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.95	0.42	19.8	1.000	736	0.46	22.2	0.0	42.0	D		
LTR	0.00	0.42	11.9	1.000	774	0.11	0.0	0.0	11.9	B	33.2	C
R	0.66	0.42	16.5	1.000	658	0.24	2.5	0.0	19.0	B		
Westbound												
Northbound												
L	0.68	0.08	31.5	1.000	260	0.25	7.1	0.0	38.6	D		
T	0.87	0.46	17.1	1.000	2320	0.39	3.7	0.0	20.8	C	22.2	C
Southbound												

T	0.64	0.33	20.0	1.000	1667	0.22	0.9	0.0	20.9	C	21.1	C
R	0.61	0.33	19.8	1.000	520	0.20	2.2	0.0	21.9	C		

Intersection delay = 24.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 70.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 70.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	70.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	20.4	19.8	0.00	0.0	0.0	42.0

LTR	0.0	0.00	20.4	11.9	0.00	0.0	0.0	11.9
R	0.0	0.00	20.4	16.5	0.00	0.0	0.0	19.0
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	32.3	31.5	0.00	0.0	0.0	38.6
T	0.0	0.00	19.0	17.1	0.00	0.0	0.0	20.8
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	23.5	20.0	0.00	0.0	0.0	20.9
R	0.0	0.00	23.5	19.8	0.00	0.0	0.0	21.9

Intersection Delay 24.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	701	0	436				91	736		394	319	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	0 3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	736	774	658				133	851		611	520	
Flow Ratio	0.4	0.0	0.3				0.1	0.4		0.2	0.2	
v/c Ratio	0.95	0.00	0.66				0.68	0.86		0.64	0.61	
Grn Ratio	0.42	0.42	0.42				0.08	0.46		0.33	0.33	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
Q1	13.2	0.0	6.8				1.7	12.8		6.5	5.2	
kB	0.5	0.5	0.5				0.2	0.5		0.4	0.4	
Q2	4.7	0.0	0.9				0.4	2.9		0.8	0.6	
Q Average	17.9	0.0	7.7				2.1	15.7		7.3	5.8	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.2	1.2	
BOQ	20.9	0.0	9.1				2.5	18.4		8.6	6.9	
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6	1.5				1.6	1.5		1.5	1.5	
BOQ	26.3	0.0	11.8				3.3	23.2		11.2	9.0	
QSRatio												
90th Percentile Output:												
fB%	1.6	1.8	1.7				1.8	1.6		1.7	1.7	
BOQ	28.0	0.0	12.9				3.7	24.9		12.3	9.9	
QSRatio												
95th Percentile Output:												
fB%	1.7	2.1	1.9				2.0	1.8		1.9	1.9	
BOQ	30.9	0.0	14.6				4.2	27.5		13.9	11.3	
QSRatio												
98th Percentile Output:												
fB%	2.0	2.7	2.3				2.6	2.0		2.3	2.3	
BOQ	35.0	0.0	17.4				5.3	31.4		16.6	13.6	
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 NB Ramps

Inter.: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
LGConfig				L		LT	R	L	T		T	R
Volume				346	2	248	440	872			1474	588
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	19.9	0.0				25.1	21.9	12.5 0.0
Yellow	3.2					3.2	3.6	3.6
All Red	0.5					0.5	0.5	0.5

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	371	1770	0.98	0.21	78.9	E		
LT	390	1863	0.01	0.21	29.7	C	65.6	E
R	332	1583	0.79	0.21	47.4	D		
Northbound								
L	468	1770	0.99	0.26	73.5	E		
T	3595	5074	0.26	0.71	5.0	A	27.9	C
Southbound								
T	2056	5074	0.75	0.41	25.8	C	34.0	C
R	642	1583	0.96	0.41	54.4	D		

Intersection Delay = 36.7 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Redhill Ave at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 NB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				346	2	248	440	872			1474	588
% Heavy Veh				2	2	2	2	2			2	2
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
PK 15 Vol				91	1	65	116	229			388	155
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900	1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
LGConfig				L		LT	R	L		T			T	R
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0	
Adj Flow				364	2	261	463	918			1552	619
%InSharedLn				0								
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000
Peds Bikes	0				0						0	
Buses				0	0	0	0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Arriv. Type				3	3	3	3	3			3	3
Unit Ext.				3.0	3.0	3.0	3.0	3.0			3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ext of g				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	19.9	0.0				25.1	21.9	12.5	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				346	2	248	440	872			1474	588
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
Adj flow				364	2	261	463	918			1552	619
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
Lane group				L		LT	R	L		T			T	R
Adj flow				364	2	261	463	918			1552	619
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L	LT	R	L	T			T	R	
So			1900	1900	1900	1900	1900			1900	1900	
Lanes	0	0	1	1	1	1	3	0	0	3	1	
fW			1.000	1.000	1.000	1.000	1.000			1.000	1.000	
fHV			0.980	0.980	0.980	0.980	0.980			0.980	0.980	
fG			1.000	1.000	1.000	1.000	1.000			1.000	1.000	
fP			1.000	1.000	1.000	1.000	1.000			1.000	1.000	
fBB			1.000	1.000	1.000	1.000	1.000			1.000	1.000	
fA			1.000	1.000	1.000	1.000	1.000			1.000	1.000	
fLU			1.000	1.000	1.000	1.000	0.908			0.908	1.000	
fRT				1.000	0.850		1.000			1.000	0.850	
fLT			0.950	1.000		0.950	1.000			1.000		
Sec.												
fLpb			1.000	1.000		1.000	1.000			1.000		
fRpb				1.000	1.000		1.000			1.000	1.000	
S			1770	1863	1583	1770	5074			5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	364	1770	#	0.21	0.21	371	0.98
Prot								
Perm								
Thru	LT	2	1863		0.00	0.21	390	0.01
Right	R	261	1583		0.16	0.21	332	0.79
Northbound								
Prot								
Perm								
Left	L	463	1770	#	0.26	0.26	468	0.99
Prot								
Perm								
Thru	T	918	5074		0.18	0.71	3595	0.26
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1552	5074		0.31	0.41	2056	0.75
Right	R	619	1583	#	0.39	0.41	642	0.96

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.86
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.98

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.98	0.21	37.4	1.000	371	0.49	41.5	0.0	78.9	E		
LT	0.01	0.21	29.7	1.000	390	0.11	0.0	0.0	29.7	C	65.6	E
R	0.79	0.21	35.5	1.000	332	0.33	11.8	0.0	47.4	D		
Northbound												
L	0.99	0.26	34.8	1.000	468	0.49	38.7	0.0	73.5	E		
T	0.26	0.71	4.9	1.000	3595	0.11	0.0	0.0	5.0	A	27.9	C
Southbound												

T	0.75	0.41	24.2	1.000	2056	0.31	1.6	0.0	25.8	C	34.0	C
R	0.96	0.41	27.6	1.000	642	0.47	26.8	0.0	54.4	D		

Intersection delay = 36.7 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	37.5	37.4	0.00	0.0	0.0	78.9
LT	0.0	0.00	37.5	29.7	0.00	0.0	0.0	29.7
R	0.0	0.00	37.5	35.5	0.00	0.0	0.0	47.4
Northbound								
L	0.0	0.00	35.0	34.8	0.00	0.0	0.0	73.5
T	0.0	0.00	13.8	4.9	0.00	0.0	0.0	5.0
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	28.3	24.2	0.00	0.0	0.0	25.8
R	0.0	0.00	28.3	27.6	0.00	0.0	0.0	54.4

Intersection Delay 36.7 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound				Southbound		
LaneGroup				L	LT	R	L	T			T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0			0.0	0.0	
Flow Rate				364	2	261	463	337			569	619	
So				1900	1900	1900	1900	1900			1900	1900	
No.Lanes	0	0	0	1	1	1	1	3	0	0	3	1	
SL				1770	1863	1583	1770	1862			1862	1583	
LnCapacity				371	390	332	468	1319			754	642	
Flow Ratio				0.2	0.0	0.2	0.3	0.2			0.3	0.4	
v/c Ratio				0.98	0.01	0.79	0.99	0.26			0.75	0.96	
Grn Ratio				0.21	0.21	0.21	0.26	0.71			0.41	0.41	
I Factor					1.000			1.000			1.000		
AT or PVG				3	3	3	3	3			3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00			1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00			1.00	1.00	
Q1				9.6	0.0	6.5	12.2	3.2			12.9	15.9	
kB				0.4	0.4	0.4	0.5	0.8			0.6	0.5	
Q2				3.8	0.0	1.2	4.8	0.3			1.7	5.2	
Q Average				13.4	0.0	7.7	17.0	3.5			14.6	21.2	
Q Spacing				25.0	25.0	25.0	25.0	25.0			25.0	25.0	
Q Storage				0	0	0	0	0			0	0	
Q S Ratio													
70th Percentile Output:													
fB%				1.2	1.2	1.2	1.2	1.2			1.2	1.2	
BOQ				15.7	0.1	9.1	19.8	4.1			17.1	24.5	
QSRatio													
85th Percentile Output:													
fB%				1.5	1.6	1.5	1.5	1.6			1.5	1.4	
BOQ				20.0	0.1	11.8	25.0	5.4			21.7	30.6	
QSRatio													
90th Percentile Output:													
fB%				1.6	1.8	1.7	1.6	1.7			1.6	1.5	
BOQ				21.5	0.1	12.9	26.7	6.0			23.2	32.6	
QSRatio													
95th Percentile Output:													
fB%				1.8	2.1	1.9	1.7	2.0			1.8	1.7	
BOQ				23.9	0.1	14.6	29.4	6.9			25.8	35.7	
QSRatio													
98th Percentile Output:													
fB%				2.1	2.7	2.3	2.0	2.5			2.0	1.9	
BOQ				27.5	0.1	17.4	33.5	8.5			29.5	40.1	
QSRatio													

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 NB Ramps

Inter.: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
LGConfig				L		LT	R	L	T		T	R
Volume				363	38	409	464	1075			790	290
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left A			
Thru					Thru A	A	A	
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	20.9	0.0			21.3	6.2	6.0	0.0
Yellow	3.2				3.2	3.6	3.6	
All Red	0.5				0.5	0.5	0.5	

Cycle Length: 70.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	528	1770	0.72	0.30	26.8	C		
LT	556	1863	0.07	0.30	17.7	B	35.8	D
R	473	1583	0.91	0.30	45.4	D		
Northbound								
L	539	1770	0.91	0.30	42.3	D		
T	2994	5074	0.38	0.59	7.7	A	18.1	B
Southbound								
T	1182	5074	0.70	0.23	26.6	C	30.1	C
R	369	1583	0.83	0.23	39.8	D		

Intersection Delay = 26.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Redhill Ave at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 NB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				363	38	409	464	1075			790	290
% Heavy Veh				2	2	2	2	2			2	2
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
PK 15 Vol				96	10	108	122	283			208	76
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900	1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
LGConfig				L		LT	R	L		T			T	R
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0	
Adj Flow				382	40	431	488	1132			832	305
%InSharedLn				0								
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000
Peds Bikes	0				0						0	
Buses				0	0	0	0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Arriv. Type				3	3	3	3	3			3	3
Unit Ext.				3.0	3.0	3.0	3.0	3.0			3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ext of g				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru		A	A
Right		A			Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		20.9	0.0			21.3	6.2	6.0	0.0
Yellow		3.2				3.2	3.6	3.6	
All Red		0.5				0.5	0.5	0.5	

Cycle Length: 70.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				363	38	409	464	1075			790	290
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
Adj flow				382	40	431	488	1132			832	305
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
Lane group				L		LT	R	L		T			T	R
Adj flow				382	40	431	488	1132			832	305
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG				L	LT	R	L	T		T	R	
So				1900	1900	1900	1900	1900		1900	1900	
Lanes	0	0	0	1	1	1	1	3	0	3	1	
fW				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fHV				0.980	0.980	0.980	0.980	0.980		0.980	0.980	
fG				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fP				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fBB				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fA				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fLU				1.000	1.000	1.000	1.000	0.908		0.908	1.000	
fRT					1.000	0.850		1.000		1.000	0.850	
fLT				0.950	1.000		0.950	1.000		1.000		
Sec.												
fLpb				1.000	1.000		1.000	1.000		1.000		
fRpb					1.000	1.000		1.000		1.000	1.000	
S				1770	1863	1583	1770	5074		5074	1583	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	382	1770		0.22	0.30	528	0.72
Prot								
Perm								
Thru	LT	40	1863		0.02	0.30	556	0.07
Right	R	431	1583	#	0.27	0.30	473	0.91
Northbound								
Prot								
Perm								
Left	L	488	1770	#	0.28	0.30	539	0.91
Prot								
Perm								
Thru	T	1132	5074		0.22	0.59	2994	0.38
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	832	5074		0.16	0.23	1182	0.70
Right	R	305	1583	#	0.19	0.23	369	0.83

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.74
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.89

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.72	0.30	22.0	1.000	528	0.28	4.9	0.0	26.8	C		
LT	0.07	0.30	17.6	1.000	556	0.11	0.1	0.0	17.7	B	35.8	D
R	0.91	0.30	23.7	1.000	473	0.43	21.8	0.0	45.4	D		
Northbound												
L	0.91	0.30	23.4	1.000	539	0.43	18.9	0.0	42.3	D		
T	0.38	0.59	7.6	1.000	2994	0.11	0.1	0.0	7.7	A	18.1	B
Southbound												

T	0.70	0.23	24.6	1.000	1182	0.27	1.9	0.0	26.6	C	30.1	C
R	0.83	0.23	25.5	1.000	369	0.36	14.3	0.0	39.8	D		

Intersection delay = 26.1 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	70.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	70.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	70.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	24.5	22.0	0.00	0.0	0.0	26.8
LT	0.0	0.00	24.5	17.6	0.00	0.0	0.0	17.7
R	0.0	0.00	24.5	23.7	0.00	0.0	0.0	45.4
Northbound								
L	0.0	0.00	24.4	23.4	0.00	0.0	0.0	42.3
T	0.0	0.00	14.4	7.6	0.00	0.0	0.0	7.7
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	26.9	24.6	0.00	0.0	0.0	26.6
R	0.0	0.00	26.9	25.5	0.00	0.0	0.0	39.8

Intersection Delay 26.1 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	LT	R	L	T		T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate				382	40	431	488	415		305	305	
So				1900	1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0	1	1	1	1	3	0	3	1	
SL				1770	1863	1583	1770	1862		1862	1583	
LnCapacity				528	556	473	539	1099		433	369	
Flow Ratio				0.2	0.0	0.3	0.3	0.2		0.2	0.2	
v/c Ratio				0.72	0.07	0.91	0.91	0.38		0.70	0.83	
Grn Ratio				0.30	0.30	0.30	0.30	0.59		0.23	0.23	
I Factor					1.000			1.000		1.000		
AT or PVG				3	3	3	3	3		3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Q1				6.6	0.6	8.1	9.1	4.3		5.4	5.6	
kB				0.4	0.4	0.4	0.4	0.6		0.4	0.3	
Q2				1.0	0.0	2.6	2.7	0.4		0.8	1.3	
Q Average				7.6	0.6	10.7	11.9	4.6		6.3	7.0	
Q Spacing				25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage				0	0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.2	1.2	1.2	1.2	1.2		1.2	1.2	
BOQ				9.0	0.7	12.6	13.9	5.5		7.4	8.2	
QSRatio												
85th Percentile Output:												
fB%				1.5	1.6	1.5	1.5	1.6		1.5	1.5	
BOQ				11.7	0.9	16.1	17.8	7.2		9.7	10.7	
QSRatio												
90th Percentile Output:												
fB%				1.7	1.8	1.6	1.6	1.7		1.7	1.7	
BOQ				12.8	1.1	17.4	19.2	8.0		10.6	11.7	
QSRatio												
95th Percentile Output:												
fB%				1.9	2.1	1.8	1.8	2.0		1.9	1.9	
BOQ				14.5	1.2	19.5	21.5	9.1		12.0	13.3	
QSRatio												
98th Percentile Output:												
fB%				2.3	2.7	2.1	2.1	2.4		2.3	2.3	
BOQ				17.3	1.6	22.8	24.9	11.1		14.5	15.9	
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	0	0	0	0	4	1	1	3	0
LGConfig		LT	R					T	R	L	T	
Volume	251	0	519					1041	611	469	1369	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	28.1	0.0				24.8	24.1	7.4	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	498	1774	0.53	0.28	31.5	C	115.8	F
R	445	1583	1.23	0.28	156.6	F		
Westbound								
Northbound								
T	2408	6765	0.46	0.36	24.9	C	58.2	E
R	564	1583	1.14	0.36	115.0	F		
Southbound								
L	439	1770	1.13	0.25	119.4	F		
T	3252	5074	0.44	0.64	9.1	A	37.2	D

Intersection Delay = 59.6 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Redhill Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	251	0	519					1041	611	469	1369	
% Heavy Veh	2	2	2					2	2	2	2	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
PK 15 Vol	66	0	137					274	161	123	360	
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat		1900	1900					1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	1	1	0	0	0	0	4	1	1	3	0
LGConfig		LT	R					T	R	L	T	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			
Adj Flow		264	546					1096	643	494	1441	
%InSharedLn												
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	
Peds Bikes		0			0			0				
Buses		0	0					0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0					0.0	0.0	0.0	0.0	
Arriv. Type		3	3					3	3	3	3	
Unit Ext.		3.0	3.0					3.0	3.0	3.0	3.0	
I Factor		1.000						1.000			1.000	
Lost Time		2.0	2.0					2.0	2.0	2.0	2.0	
Ext of g		2.0	2.0					2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	28.1	0.0			24.8	24.1	7.4	0.0
Yellow	3.2				3.2	3.6	3.6	
All Red	0.5				0.5	0.5	0.5	

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	251	0	519					1041	611	469	1369	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
Adj flow	264	0	546					1096	643	494	1441	
No. Lanes	0	1	1	0	0	0	0	4	1	1	3	0
Lane group		LT	R					T	R	L	T	
Adj flow		264	546					1096	643	494	1441	
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound			Southbound	
LG	LT	R					T	R	L	T	
So	1900	1900					1900	1900	1900	1900	
Lanes	0 1	0 1	0	0	0	0	4	1	1	3	0
fW	1.000	1.000					1.000	1.000	1.000	1.000	
fHV	0.980	0.980					0.980	0.980	0.980	0.980	
fG	1.000	1.000					1.000	1.000	1.000	1.000	
fP	1.000	1.000					1.000	1.000	1.000	1.000	
fBB	1.000	1.000					1.000	1.000	1.000	1.000	
fA	1.000	1.000					1.000	1.000	1.000	1.000	
fLU	1.000	1.000					0.908	1.000	1.000	0.908	
fRT	1.000	0.850					1.000	0.850		1.000	
fLT	0.952						1.000		0.950	1.000	
Sec.											
fLpb	1.000						1.000		1.000	1.000	
fRpb	1.000	1.000					1.000	1.000		1.000	
S	1774	1583					6765	1583	1770	5074	
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	264	1774		0.15	0.28	498	0.53
Right	R	546	1583	#	0.34	0.28	445	1.23
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1096	6765		0.16	0.36	2408	0.46
Right	R	643	1583	#	0.41	0.36	564	1.14
Southbound								
Prot								
Perm								
Left	L	494	1770	#	0.28	0.25	439	1.13
Prot								
Perm								
Thru	T	1441	5074		0.28	0.64	3252	0.44
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.03
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.16

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
LT	0.53	0.28	30.4	1.000	498	0.13	1.1	0.0	31.5	C	115.8	F
R	1.23	0.28	36.0	1.000	445	0.50	120.6	0.0	156.6	F		
Westbound												
Northbound												
T	0.46	0.36	24.7	1.000	2408	0.11	0.1	0.0	24.9	C	58.2	E
R	1.14	0.36	32.2	1.000	564	0.50	82.8	0.0	115.0	F		
Southbound												
L	1.13	0.25	37.6	1.000	439	0.50	81.8	0.0	119.4	F		

T 0.44 0.64 9.0 1.000 3252 0.11 0.1 0.0 9.1 A 37.2 D

Intersection delay = 59.6 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	1.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	100.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

LT	0.0	0.00	36.0	30.4	0.00	0.0	0.0	31.5
R	0.0	0.00	36.0	36.0	0.00	25.2	0.0	156.6
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	32.2	24.7	0.00	0.0	0.0	24.9
R	0.0	0.00	32.2	32.2	0.00	19.8	0.0	115.0
Southbound								
L	0.0	0.00	37.6	37.6	0.00	13.8	0.0	119.4
T	0.0	0.00	18.0	9.0	0.00	0.0	0.0	9.1
	0.0						0.0	

Intersection Delay 59.6 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	LT	R			T	R	L	T
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	264	546			301	643	494	529
So	1900	1900			1900	1900	1900	1900
No.Lanes	0 1	1	0	0 0	0	4	1	1 3 0
SL	1774	1583			1862	1583	1770	1862
LnCapacity	498	445			662	564	439	1193
Flow Ratio	0.1	0.3			0.2	0.4	0.3	0.3
v/c Ratio	0.53	1.23			0.45	1.14	1.13	0.44
Grn Ratio	0.28	0.28			0.36	0.36	0.25	0.64
I Factor	1.000				1.000			1.000
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00	1.00	1.00	1.00
Q1	6.2	15.2			6.4	17.9	13.7	7.4
kB	0.5	0.5			0.6	0.5	0.4	0.8
Q2	0.5	14.7			0.5	13.1	9.7	0.6
Q Average	6.7	29.9			6.9	30.9	23.4	8.0
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.1			1.2	1.1	1.2	1.2
BOQ	8.0	34.3			8.2	35.5	27.1	9.5
QSRatio								
85th Percentile Output:								
fB%	1.5	1.4			1.5	1.4	1.4	1.5
BOQ	10.4	42.2			10.6	43.5	33.7	12.3
QSRatio								
90th Percentile Output:								
fB%	1.7	1.5			1.7	1.5	1.5	1.7
BOQ	11.3	44.5			11.6	45.9	35.7	13.4
QSRatio								
95th Percentile Output:								
fB%	1.9	1.6			1.9	1.6	1.7	1.9
BOQ	12.9	48.2			13.2	49.7	39.0	15.1
QSRatio								
98th Percentile Output:								
fB%	2.3	1.8			2.3	1.8	1.9	2.2
BOQ	15.5	53.8			15.8	55.5	43.7	18.0
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	0	0	0	0	3	1	1	3	0
LGConfig		LT	R					T	R	L	T	
Volume	449	0	311					1105	446	381	769	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.8	0.0				17.1	11.9	8.6	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 75.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	516	1774	0.92	0.29	47.0	D	39.6	D
R	460	1583	0.71	0.29	28.9	C		
Westbound								
Northbound								
T	1664	5074	0.70	0.33	23.3	C	29.0	C
R	519	1583	0.90	0.33	43.2	D		
Southbound								
L	404	1770	0.99	0.23	71.6	E		
T	3071	5074	0.26	0.61	7.0	A	28.4	C

Intersection Delay = 31.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Redhill Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	449	0	311					1105	446	381	769	
% Heavy Veh	2	2	2					2	2	2	2	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
PK 15 Vol	118	0	82					291	117	100	202	
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat		1900	1900					1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	1	1	0	0	0	0	3	1	1	3	0
LGConfig		LT	R					T	R	L	T	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			
Adj Flow		473	327					1163	469	401	809	
%InSharedLn												
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	
Peds Bikes		0			0			0				
Buses		0	0					0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0					0.0	0.0	0.0	0.0	
Arriv. Type		3	3					3	3	3	3	
Unit Ext.		3.0	3.0					3.0	3.0	3.0	3.0	
I Factor		1.000						1.000			1.000	
Lost Time		2.0	2.0					2.0	2.0	2.0	2.0	
Ext of g		2.0	2.0					2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.8	0.0				17.1	11.9	8.6	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 75.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	449	0	311					1105	446	381	769	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
Adj flow	473	0	327					1163	469	401	809	
No. Lanes	0	1	1	0	0	0	0	3	1	1	3	0
Lane group		LT	R					T	R	L	T	
Adj flow		473	327					1163	469	401	809	
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound			Southbound	
LG	LT	R					T	R	L	T	
So	1900	1900					1900	1900	1900	1900	
Lanes	0 1	1	0	0	0	0	3	1	1	3	0
fW	1.000	1.000					1.000	1.000	1.000	1.000	
fHV	0.980	0.980					0.980	0.980	0.980	0.980	
fG	1.000	1.000					1.000	1.000	1.000	1.000	
fP	1.000	1.000					1.000	1.000	1.000	1.000	
fBB	1.000	1.000					1.000	1.000	1.000	1.000	
fA	1.000	1.000					1.000	1.000	1.000	1.000	
fLU	1.000	1.000					0.908	1.000	1.000	0.908	
fRT	1.000	0.850					1.000	0.850		1.000	
fLT	0.952						1.000		0.950	1.000	
Sec.											
fLpb	1.000						1.000		1.000	1.000	
fRpb	1.000	1.000					1.000	1.000		1.000	
S	1774	1583					5074	1583	1770	5074	
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LT	473	1774	# 0.27	0.29	516	0.92
Right	R	327	1583	0.21	0.29	460	0.71
Westbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1163	5074	0.23	0.33	1664	0.70
Right	R	469	1583	# 0.30	0.33	519	0.90
Southbound							
Prot							
Perm							
Left	L	401	1770	# 0.23	0.23	404	0.99
Prot							
Perm							
Thru	T	809	5074	0.16	0.61	3071	0.26
Right							

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.79
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.93

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
LT	0.92	0.29	25.7	1.000	516	0.44	21.3	0.0	47.0	D	39.6	D
R	0.71	0.29	23.8	1.000	460	0.27	5.1	0.0	28.9	C		
Westbound												
Northbound												
T	0.70	0.33	22.0	1.000	1664	0.27	1.3	0.0	23.3	C	29.0	C
R	0.90	0.33	24.1	1.000	519	0.42	19.2	0.0	43.2	D		
Southbound												
L	0.99	0.23	28.9	1.000	404	0.49	42.7	0.0	71.6	E		

T	0.26	0.61	6.9	1.000	3071	0.11	0.0	0.0	7.0	A	28.4	C

Intersection delay = 31.1 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	1.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	75.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

LT	0.0	0.00	26.6	25.7	0.00	0.0	0.0	47.0
R	0.0	0.00	26.6	23.8	0.00	0.0	0.0	28.9
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	25.2	22.0	0.00	0.0	0.0	23.3
R	0.0	0.00	25.2	24.1	0.00	0.0	0.0	43.2
Southbound								
L	0.0	0.00	28.9	28.9	0.00	0.0	0.0	71.6
T	0.0	0.00	14.8	6.9	0.00	0.0	0.0	7.0
	0.0						0.0	

Intersection Delay 31.1 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	LT	R			T	R	L	T
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	473	327			426	469	401	296
So	1900	1900			1900	1900	1900	1900
No.Lanes	0 1	1	0	0 0	0	3	1	1 3 0
SL	1774	1583			1862	1583	1770	1862
LnCapacity	516	460			610	519	404	1127
Flow Ratio	0.3	0.2			0.2	0.3	0.2	0.2
v/c Ratio	0.92	0.71			0.70	0.90	0.99	0.26
Grn Ratio	0.29	0.29			0.33	0.33	0.23	0.61
I Factor	1.000				1.000			1.000
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00	1.00	1.00	1.00
Q1	9.5	6.1			7.7	9.3	8.3	2.9
kB	0.4	0.4			0.5	0.4	0.4	0.7
Q2	3.0	0.9			1.0	2.7	4.1	0.2
Q Average	12.5	7.0			8.8	12.1	12.4	3.1
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2	1.2	1.2	1.2
BOQ	14.6	8.3			10.3	14.2	14.5	3.7
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5			1.5	1.5	1.5	1.6
BOQ	18.7	10.8			13.3	18.1	18.6	4.9
QSRatio								
90th Percentile Output:								
fB%	1.6	1.7			1.7	1.6	1.6	1.7
BOQ	20.1	11.8			14.5	19.5	20.0	5.5
QSRatio								
95th Percentile Output:								
fB%	1.8	1.9			1.9	1.8	1.8	2.0
BOQ	22.5	13.3			16.4	21.8	22.3	6.3
QSRatio								
98th Percentile Output:								
fB%	2.1	2.3			2.2	2.1	2.1	2.5
BOQ	26.0	16.0			19.3	25.3	25.8	7.8
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Newport Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Volume	372	62	336	30		110		1068	62	196	1564	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	7.3	21.2	0.0		10.6	9.4	8.3	0.0
Yellow	3.6	3.6			3.2	3.9	3.9	
All Red	1.0	1.0			1.0	1.0	1.0	

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	469	1770	0.84	0.27	40.2	D		
LT	494	1863	0.13	0.27	22.5	C	39.8	D
R	419	1583	0.84	0.27	42.5	D		
Westbound								
L	162	1770	0.20	0.09	34.2	C		
							56.9	E
R	144	1583	0.81	0.09	63.1	E		
Northbound								
TR	1422	5033	0.84	0.28	31.5	C	31.5	C
Southbound								
L	235	1770	0.88	0.13	63.0	E		
T	2372	5074	0.69	0.47	17.7	B	22.7	C

Intersection Delay = 30.0 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Newport Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Newport Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	372	62	336	30		110		1068	62	196	1564	
% Heavy Veh	2	2	2	2		2		2	2	2	2	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol	98	16	88	8		29		281	16	52	412	
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900	1900	1900		1900		1900		1900	1900	
ParkExist												
NumPark												
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol		0				0			0			
Adj Flow	392	65	354	32		116		1189		206	1646	
%InSharedLn	0											
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.055			0.000	
Peds Bikes	0			0			0					
Buses	0	0	0	0		0		0		0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Arriv. Type	3	3	3	3		3		3		3	3	
Unit Ext.	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	7.3	21.2	0.0			10.6	9.4	8.3	0.0
Yellow	3.6	3.6				3.2	3.9	3.9	
All Red	1.0	1.0				1.0	1.0	1.0	

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	372	62	336	30		110		1068	62	196	1564	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow	392	65	354	32		116		1124	65	206	1646	
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
Lane group	L	LT	R	L		R		TR		L	T	
Adj flow	392	65	354	32		116		1189		206	1646	
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.055			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LT	R	L		R	TR			L	T	
So	1900	1900	1900	1900		1900	1900			1900	1900	
Lanes	1	1	1	1	0	1	0	3	0	1	3	0
fW	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fHV	0.980	0.980	0.980	0.980		0.980		0.980		0.980	0.980	
fG	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fP	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fBB	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fA	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fLU	1.000	1.000	1.000	1.000		1.000		0.908		1.000	0.908	
fRT		1.000	0.850			0.850		0.992			1.000	
fLT	0.950	1.000		0.950				1.000		0.950	1.000	
Sec.												
fLpb	1.000	1.000		1.000				1.000		1.000	1.000	
fRpb		1.000	1.000			1.000		1.000			1.000	
S	1770	1863	1583	1770		1583		5033		1770	5074	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	392	1770		0.22	0.27	469	0.84
Prot								
Perm								
Thru	LT	65	1863		0.03	0.27	494	0.13
Right	R	354	1583	#	0.22	0.27	419	0.84
Westbound								
Prot								
Perm								
Left	L	32	1770		0.02	0.09	162	0.20
Prot								
Perm								
Thru								
Right	R	116	1583	#	0.07	0.09	144	0.81
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1189	5033	#	0.24	0.28	1422	0.84
Right								
Southbound								
Prot								
Perm								
Left	L	206	1770	#	0.12	0.13	235	0.88
Prot								
Perm								
Thru	T	1646	5074		0.32	0.47	2372	0.69
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.65
Total lost time per cycle, L = 18.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.84

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.84	0.27	27.8	1.000	469	0.37	12.4	0.0	40.2	D		
LT	0.13	0.27	22.4	1.000	494	0.11	0.1	0.0	22.5	C	39.8	D
R	0.84	0.27	27.8	1.000	419	0.38	14.7	0.0	42.5	D		
Westbound												
L	0.20	0.09	33.6	1.000	162	0.11	0.6	0.0	34.2	C		
											56.9	E
R	0.81	0.09	35.7	1.000	144	0.35	27.5	0.0	63.1	E		
Northbound												
TR	0.84	0.28	27.0	1.000	1422	0.37	4.5	0.0	31.5	C	31.5	C
Southbound												
L	0.88	0.13	34.1	1.000	235	0.40	28.9	0.0	63.0	E		

T 0.69 0.47 16.8 1.000 2372 0.26 0.9 0.0 17.7 B 22.7 C

Intersection delay = 30.0 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	29.4	27.8	0.00	0.0	0.0	40.2

LT	0.0	0.00	29.4	22.4	0.00	0.0	0.0	22.5
R	0.0	0.00	29.4	27.8	0.00	0.0	0.0	42.5
Westbound								
L	0.0	0.00	36.3	33.6	0.00	0.0	0.0	34.2
	0.0						0.0	
R	0.0	0.00	36.3	35.7	0.00	0.0	0.0	63.1
Northbound								
	0.0						0.0	
TR	0.0	0.00	28.7	27.0	0.00	0.0	0.0	31.5
	0.0						0.0	
Southbound								
L	0.0	0.00	34.7	34.1	0.00	0.0	0.0	63.0
T	0.0	0.00	21.3	16.8	0.00	0.0	0.0	17.7
	0.0						0.0	

Intersection Delay 30.0 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound	Southbound	
LaneGroup	L	LT	R	L	R	TR	L	T
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate	392	65	354	32	116	436	206	604
So	1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	1	1	1	1 0	1	0 3 0	1	3 0
SL	1770	1863	1583	1770	1583	1847	1770	1862
LnCapacity	469	494	419	162	144	522	235	870
Flow Ratio	0.2	0.0	0.2	0.0	0.1	0.2	0.1	0.3
v/c Ratio	0.84	0.13	0.84	0.20	0.81	0.84	0.88	0.69
Grn Ratio	0.27	0.27	0.27	0.09	0.09	0.28	0.13	0.47
I Factor		1.000		1.000		1.000		1.000
AT or PVG	3	3	3	3	3	3	3	3
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Q1	8.2	1.1	7.4	0.7	2.5	9.1	4.5	10.6
kB	0.4	0.4	0.4	0.2	0.2	0.4	0.3	0.6
Q2	1.8	0.1	1.7	0.1	0.7	1.9	1.4	1.3
Q Average	10.0	1.2	9.2	0.7	3.2	11.0	5.9	11.9
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage	0	0	0	0	0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
BOQ	11.8	1.4	10.8	0.9	3.8	12.9	7.0	13.9
QSRatio								
85th Percentile Output:								
fB%	1.5	1.6	1.5	1.6	1.6	1.5	1.5	1.5
BOQ	15.1	1.8	13.9	1.1	5.1	16.6	9.1	17.8
QSRatio								
90th Percentile Output:								
fB%	1.6	1.8	1.7	1.8	1.7	1.6	1.7	1.6
BOQ	16.4	2.1	15.2	1.3	5.6	17.9	10.0	19.2
QSRatio								
95th Percentile Output:								
fB%	1.8	2.1	1.9	2.1	2.0	1.8	1.9	1.8
BOQ	18.4	2.4	17.1	1.5	6.5	20.0	11.4	21.5
QSRatio								
98th Percentile Output:								
fB%	2.2	2.6	2.2	2.6	2.5	2.1	2.3	2.1
BOQ	21.6	3.0	20.1	1.9	8.0	23.4	13.7	25.0
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Newport Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Volume	408	45	548	69		181		1658	71	230	1101	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		A			NB Left				
Thru		A			Thru		A	A	
Right		A			Right		A	A	
Peds					Peds				
WB Left	A				SB Left	A			
Thru					Thru	A	A	A	
Right	A				Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	10.6	35.9	0.0			10.4	8.7	26.3	0.0
Yellow	3.6	3.6				3.2	3.9	3.9	
All Red	1.0	1.0				1.0	1.0	1.0	

Cycle Length: 115.1 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	552	1770	0.78	0.31	42.9	D		
LT	581	1863	0.08	0.31	28.0	C	92.8	F
R	494	1583	1.17	0.31	135.2	F		
Westbound								
L	163	1770	0.45	0.09	51.4	D		
							181.7	F
R	146	1583	1.31	0.09	231.5	F		
Northbound								
TR	1748	5043	1.04	0.35	70.7	E	70.7	E
Southbound								
L	160	1770	1.51	0.09	312.4	F		
T	2403	5074	0.48	0.47	20.8	C	71.2	E

Intersection Delay = 82.4 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: PM
Intersection: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2015
Project ID: IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Newport Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	408	45	548	69		181		1658	71	230	1101	
% Heavy Veh	2	2	2	2		2		2	2	2	2	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol	107	12	144	18		48		436	19	61	290	
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900	1900	1900		1900		1900		1900	1900	
ParkExist												
NumPark												
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol		0			0			0				
Adj Flow	429	47	577	73		191		1820		242	1159	
%InSharedLn	0											
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.041			0.000	
Peds Bikes	0			0			0					
Buses	0	0	0	0		0		0		0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Arriv. Type	3	3	3	3		3		3		3	3	
Unit Ext.	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	10.6	35.9	0.0		10.4	8.7	26.3	0.0
Yellow	3.6	3.6			3.2	3.9	3.9	
All Red	1.0	1.0			1.0	1.0	1.0	

Cycle Length: 115.1 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	408	45	548	69		181		1658	71	230	1101	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow	429	47	577	73		191		1745	75	242	1159	
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
Lane group	L	LT	R	L		R		TR		L	T	
Adj flow	429	47	577	73		191		1820		242	1159	
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.041			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LT	R	L		R	TR			L	T	
So	1900	1900	1900	1900		1900	1900			1900	1900	
Lanes	1	1	1	1	0	1	0	3	0	1	3	0
fW	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fHV	0.980	0.980	0.980	0.980		0.980		0.980		0.980	0.980	
fG	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fP	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fBB	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fA	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fLU	1.000	1.000	1.000	1.000		1.000		0.908		1.000	0.908	
fRT		1.000	0.850			0.850		0.994			1.000	
fLT	0.950	1.000		0.950				1.000		0.950	1.000	
Sec.												
fLpb	1.000	1.000		1.000				1.000		1.000	1.000	
fRpb		1.000	1.000			1.000		1.000			1.000	
S	1770	1863	1583	1770		1583		5043		1770	5074	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	429	1770		0.24	0.31	552	0.78
Prot								
Perm								
Thru	LT	47	1863		0.03	0.31	581	0.08
Right	R	577	1583	#	0.36	0.31	494	1.17
Westbound								
Prot								
Perm								
Left	L	73	1770		0.04	0.09	163	0.45
Prot								
Perm								
Thru								
Right	R	191	1583	#	0.12	0.09	146	1.31
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1820	5043	#	0.36	0.35	1748	1.04
Right								
Southbound								
Prot								
Perm								
Left	L	242	1770	#	0.14	0.09	160	1.51
Prot								
Perm								
Thru	T	1159	5074		0.23	0.47	2403	0.48
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.98
Total lost time per cycle, L = 18.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.17

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.78	0.31	36.0	1.000	552	0.33	6.9	0.0	42.9	D		
LT	0.08	0.31	28.0	1.000	581	0.11	0.1	0.0	28.0	C	92.8	F
R	1.17	0.31	39.6	1.000	494	0.50	95.6	0.0	135.2	F		
Westbound												
L	0.45	0.09	49.5	1.000	163	0.11	2.0	0.0	51.4	D		
											181.7	F
R	1.31	0.09	52.3	1.000	146	0.50	179.2	0.0	231.5	F		
Northbound												
TR	1.04	0.35	37.6	1.000	1748	0.50	33.1	0.0	70.7	E	70.7	E
Southbound												
L	1.51	0.09	52.3	1.000	160	0.50	260.1	0.0	312.4	F		

T 0.48 0.47 20.7 1.000 2403 0.11 0.2 0.0 20.8 C 71.2 E

Intersection delay = 82.4 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 115.1 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 115.1 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	115.1 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	39.6	36.0	0.00	0.0	0.0	42.9

LT	0.0	0.00	39.6	28.0	0.00	0.0	0.0	28.0
R	0.0	0.00	39.6	39.6	0.00	20.8	0.0	135.2
Westbound								
L	0.0	0.00	52.3	49.5	0.00	0.0	0.0	51.4
	0.0						0.0	
R	0.0	0.00	52.3	52.3	0.00	11.3	0.0	231.5
Northbound								
	0.0						0.0	
TR	0.0	0.00	37.6	37.6	0.00	18.0	0.0	70.7
	0.0						0.0	
Southbound								
L	0.0	0.00	52.3	52.3	0.00	20.5	0.0	312.4
T	0.0	0.00	30.3	20.7	0.00	0.0	0.0	20.8
	0.0						0.0	

Intersection Delay 82.4 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound	Southbound	
LaneGroup	L	LT	R	L	R	TR	L	T
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate	429	47	577	73	191	668	242	425
So	1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	1	1	1	1 0	1	0 3 0	1	3 0
SL	1770	1863	1583	1770	1583	1851	1770	1862
LnCapacity	552	581	494	163	146	641	160	882
Flow Ratio	0.2	0.0	0.4	0.0	0.1	0.4	0.1	0.2
v/c Ratio	0.78	0.08	1.17	0.45	1.31	1.04	1.51	0.48
Grn Ratio	0.31	0.31	0.31	0.09	0.09	0.35	0.09	0.47
I Factor		1.000		1.000		1.000		1.000
AT or PVG	3	3	3	3	3	3	3	3
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Q1	12.5	1.1	18.4	2.2	6.1	21.4	7.7	9.3
kB	0.6	0.6	0.5	0.3	0.3	0.6	0.3	0.7
Q2	1.8	0.1	13.2	0.2	6.5	9.0	11.0	0.7
Q Average	14.2	1.1	31.7	2.4	12.7	30.4	18.7	10.0
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage	0	0	0	0	0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2	1.1	1.2	1.2	1.1	1.2	1.2
BOQ	16.6	1.3	36.3	2.9	14.8	34.9	21.8	11.7
QSRatio								
85th Percentile Output:								
fB%	1.5	1.6	1.4	1.6	1.5	1.4	1.5	1.5
BOQ	21.1	1.8	44.5	3.8	18.9	42.8	27.3	15.1
QSRatio								
90th Percentile Output:								
fB%	1.6	1.8	1.5	1.8	1.6	1.5	1.6	1.6
BOQ	22.7	2.0	46.9	4.3	20.4	45.2	29.1	16.4
QSRatio								
95th Percentile Output:								
fB%	1.8	2.1	1.6	2.0	1.8	1.6	1.7	1.8
BOQ	25.2	2.3	50.8	4.9	22.7	49.0	32.1	18.4
QSRatio								
98th Percentile Output:								
fB%	2.0	2.6	1.8	2.5	2.1	1.8	1.9	2.2
BOQ	28.9	2.9	56.6	6.1	26.3	54.6	36.3	21.5
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 NB Ramps

Inter.: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Volume				756		450		820	620		1064	930
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		24.3	0.0			9.6	4.4	0.0
Yellow		4.3				4.3	3.6	
All Red		3.5				3.5	2.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1392	3437	0.57	0.41	14.4	B		
							16.4	B
R	641	1583	0.74	0.41	19.7	B		
Northbound								
T	1844	5074	0.47	0.36	14.8	B	8.5	A
R	1583	1583	0.41	1.00	0.2	A		
Southbound								
T	1844	5074	0.61	0.36	16.2	B	9.0	A
R	1583	1583	0.62	1.00	0.7	A		

Intersection Delay = 10.8 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Culver at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 NB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				756		450		820	620		1064	930
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				199		118		216	163		280	245
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				796		474		863	653		1120	979
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		24.3	0.0			9.6	4.4	0.0
Yellow		4.3				4.3	3.6	
All Red		3.5				3.5	2.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				756		450		820	620		1064	930
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				796		474		863	653		1120	979
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
Lane group				L		R		T	R		T	R
Adj flow				796		474		863	653		1120	979
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		T		R
So				1900		1900	1900	1900		1900		1900
Lanes	0	0	0	2	0	1	0 3	1	0	3		1
fW				1.000		1.000	1.000	1.000		1.000		1.000
fHV				0.980		0.980	0.980	0.980		0.980		0.980
fG				1.000		1.000	1.000	1.000		1.000		1.000
fP				1.000		1.000	1.000	1.000		1.000		1.000
fBB				1.000		1.000	1.000	1.000		1.000		1.000
fA				1.000		1.000	1.000	1.000		1.000		1.000
fLU				0.971		1.000	0.908	1.000		0.908		1.000
fRT						0.850	1.000	0.850		1.000		0.850
fLT				0.950			1.000			1.000		
Sec.												
fLpb				1.000			1.000			1.000		
fRpb						1.000	1.000	1.000		1.000		1.000
S				3437		1583	5074	1583		5074		1583
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Westbound							
Prot							
Perm							
Left	L	796	3437	0.23	0.41	1392	0.57
Prot							
Perm							
Thru							
Right	R	474	1583	0.30	0.41	641	0.74
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	863	5074	0.17	0.36	1844	0.47
Right	R	653	1583	0.41	1.00	1583	0.41
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1120	5074	0.22	0.36	1844	0.61
Right	R	979	1583	# 0.62	1.00	1583	0.62

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.62
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.62

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.57	0.41	13.8	1.000	1392	0.17	0.6	0.0	14.4	B		
											16.4	B
R	0.74	0.41	15.2	1.000	641	0.30	4.6	0.0	19.7	B		
Northbound												
T	0.47	0.36	14.7	1.000	1844	0.11	0.2	0.0	14.8	B	8.5	A
R	0.41	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.61	0.36	15.6	1.000	1844	0.19	0.6	0.0	16.2	B	9.0	A
R	0.62	1.00	0.0	0.950	1583	0.20	0.7	0.0	0.7	A		

Intersection delay = 10.8 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	17.8	13.8	0.00	0.0	0.0	14.4
	0.0						0.0	
R	0.0	0.00	17.8	15.2	0.00	0.0	0.0	19.7
Northbound								
	0.0						0.0	
T	0.0	0.00	19.1	14.7	0.00	0.0	0.0	14.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	19.1	15.6	0.00	0.0	0.0	16.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.7

Intersection Delay 10.8 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				409	474	316	653	411	979
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	0 1	0 3	1	0 3	1
SL				1770	1583	1862	1583	1862	1583
LnCapacity				716	641	676	1583	676	1583
Flow Ratio				0.2	0.3	0.2	0.4	0.2	0.6
v/c Ratio				0.57	0.74	0.47	0.41	0.61	0.62
Grn Ratio				0.41	0.41	0.36	1.00	0.36	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00		1.00	
Q1				5.3	6.7	4.0		5.6	
kB				0.4	0.4	0.4	0.7	0.4	0.7
Q2				0.6	1.1	0.4	0.5	0.7	1.1
Q Average				5.9	7.8	4.4		6.2	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2	1.2	1.2		1.2	
BOQ				6.9	9.3	5.2		7.4	
QSRatio									
85th Percentile Output:									
fB%				1.5	1.5	1.6		1.5	
BOQ				9.1	12.0	6.9		9.6	
QSRatio									
90th Percentile Output:									
fB%				1.7	1.7	1.7		1.7	
BOQ				9.9	13.1	7.6		10.6	
QSRatio									
95th Percentile Output:									
fB%				1.9	1.9	2.0		1.9	
BOQ				11.3	14.8	8.7		12.0	
QSRatio									
98th Percentile Output:									
fB%				2.3	2.2	2.4		2.3	
BOQ				13.7	17.6	10.6		14.5	
QSRatio									

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 NB Ramps

Inter.: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Volume				464		788		1852	430		1126	660
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right	A	A		
Peds					Peds				
NB Right		A			EB Right				
SB Right		A			WB Right				
Green		46.0	0.0			8.8	23.5	0.0	
Yellow		4.3				4.3	3.6		
All Red		3.5				3.5	2.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1581	3437	0.31	0.46	17.1	B		
							72.8	E
R	728	1583	1.14	0.46	105.6	F		
Northbound								
T	2035	5074	0.96	0.40	40.7	D	33.1	C
R	1583	1583	0.29	1.00	0.1	A		
Southbound								
T	2035	5074	0.58	0.40	23.8	C	15.1	B
R	1583	1583	0.44	1.00	0.2	A		

Intersection Delay = 36.4 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Culver at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 NB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				464		788		1852	430		1126	660
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				122		207		487	113		296	174
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				488		829		1949	453		1185	695
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	46.0	0.0			8.8	23.5	0.0	
Yellow	4.3				4.3	3.6		
All Red	3.5				3.5	2.5		

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				464		788		1852	430		1126	660
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				488		829		1949	453		1185	695
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
Lane group				L		R		T	R		T	R
Adj flow				488		829		1949	453		1185	695
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		T		R
So				1900		1900	1900	1900		1900		1900
Lanes	0	0	0	2	0	1	0 3	1	0	3		1
fW				1.000		1.000	1.000	1.000		1.000		1.000
fHV				0.980		0.980	0.980	0.980		0.980		0.980
fG				1.000		1.000	1.000	1.000		1.000		1.000
fP				1.000		1.000	1.000	1.000		1.000		1.000
fBB				1.000		1.000	1.000	1.000		1.000		1.000
fA				1.000		1.000	1.000	1.000		1.000		1.000
fLU				0.971		1.000	0.908	1.000		0.908		1.000
fRT						0.850	1.000	0.850		1.000		0.850
fLT				0.950			1.000			1.000		
Sec.												
fLpb				1.000			1.000			1.000		
fRpb						1.000	1.000	1.000		1.000		1.000
S				3437		1583	5074	1583		5074		1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	488	3437		0.14	0.46	1581	0.31
Prot								
Perm								
Thru								
Right	R	829	1583	#	0.52	0.46	728	1.14
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1949	5074	#	0.38	0.40	2035	0.96
Right	R	453	1583		0.29	1.00	1583	0.29
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1185	5074		0.23	0.40	2035	0.58
Right	R	695	1583		0.44	1.00	1583	0.44

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.91
Total lost time per cycle, L = 13.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.05

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.31	0.46	17.0	1.000	1581	0.11	0.1	0.0	17.1	B		
											72.8	E
R	1.14	0.46	27.0	1.000	728	0.50	78.6	0.0	105.6	F		
Northbound												
T	0.96	0.40	29.1	1.000	2035	0.47	11.6	0.0	40.7	D	33.1	C
R	0.29	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.58	0.40	23.4	1.000	2035	0.17	0.4	0.0	23.8	C	15.1	B
R	0.44	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 36.4 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	100.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	27.0	17.0	0.00	0.0	0.0	17.1
	0.0						0.0	
R	0.0	0.00	27.0	27.0	0.00	25.2	0.0	105.6
Northbound								
	0.0						0.0	
T	0.0	0.00	30.0	29.1	0.00	0.0	0.0	40.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	30.0	23.4	0.00	0.0	0.0	23.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 36.4 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				251	829	715	453	435	695
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2 0	1	0 3	1	0 3	1
SL				1770	1583	1862	1583	1862	1583
LnCapacity				814	728	747	1583	747	1583
Flow Ratio				0.1	0.5	0.4	0.3	0.2	0.4
v/c Ratio				0.31	1.14	0.96	0.29	0.58	0.44
Grn Ratio				0.46	0.46	0.40	1.00	0.40	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00		1.00	
Q1				4.4	23.0	19.3		9.4	
kB				0.6	0.6	0.6	1.0	0.6	1.0
Q2				0.3	16.5	5.7	0.4	0.8	0.8
Q Average				4.7	39.5	25.0		10.3	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2	1.1	1.2		1.2	
BOQ				5.6	44.9	28.8		12.1	
QSRatio									
85th Percentile Output:									
fB%				1.6	1.4	1.4		1.5	
BOQ				7.3	54.5	35.8		15.6	
QSRatio									
90th Percentile Output:									
fB%				1.7	1.5	1.5		1.6	
BOQ				8.0	57.5	37.9		16.9	
QSRatio									
95th Percentile Output:									
fB%				2.0	1.6	1.6		1.8	
BOQ				9.2	61.9	41.2		18.9	
QSRatio									
98th Percentile Output:									
fB%				2.4	1.7	1.8		2.2	
BOQ				11.2	69.0	46.1		22.1	
QSRatio									

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 SB Ramps

Inter.: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	299	0	531					1115	271		1524	251
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	23.9	0.0				4.5	11.9	0.0	
Yellow	3.6					4.3	4.3		
All Red	2.5					2.5	2.5		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	705	1770	0.45	0.40	13.7	B		
LTR	742	1863	0.00	0.40	10.9	B	24.8	C
R	631	1583	0.89	0.40	31.0	C		
Westbound								
Northbound								
T	1962	5074	0.60	0.39	15.2	B	12.2	B
R	1583	1583	0.18	1.00	0.1	A		
Southbound								
T	1962	5074	0.82	0.39	19.3	B	16.6	B
R	1583	1583	0.17	1.00	0.1	A		

Intersection Delay = 16.8 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: AM
Intersection: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2015
Project ID: IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	299	0	531					1115	271		1524	251
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	79	0	140					293	71		401	66
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	315	0	559					1174	285		1604	264
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	23.9	0.0			4.5	11.9	0.0	
Yellow	3.6				4.3	4.3		
All Red	2.5				2.5	2.5		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	299	0	531					1115	271		1524	251
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	315	0	559					1174	285		1604	264
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	315	0	559					1174	285		1604	264
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound							Northbound							Southbound						
LG	L		LTR	R											T	R						T	R				
So	1900		1900	1900											1900	1900						1900	1900				
Lanes	1		1		0		0		0		0				3	1		0				3	1				
fW	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fHV	0.980		0.980	0.980											0.980	0.980						0.980	0.980				
fG	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fP	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fBB	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fA	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fLU	1.000		1.000	1.000											0.908	1.000						0.908	1.000				
fRT			1.000	0.850											1.000	0.850						1.000	0.850				
fLT	0.950		1.000												1.000							1.000					
Sec.																											
fLpb	1.000		1.000												1.000							1.000					
fRpb			1.000	1.000											1.000	1.000						1.000	1.000				
S	1770		1863	1583											5074	1583						5074	1583				
Sec.																											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	315	1770		0.18	0.40	705	0.45
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.40	742	0.00
Right	R	559	1583	#	0.35	0.40	631	0.89
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1174	5074		0.23	0.39	1962	0.60
Right	R	285	1583		0.18	1.00	1583	0.18
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1604	5074	#	0.32	0.39	1962	0.82
Right	R	264	1583		0.17	1.00	1583	0.17

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.67
Total lost time per cycle, L = 12.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.85

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.45	0.40	13.2	1.000	705	0.11	0.5	0.0	13.7	B		
LTR	0.00	0.40	10.9	1.000	742	0.11	0.0	0.0	10.9	B	24.8	C
R	0.89	0.40	16.8	1.000	631	0.41	14.3	0.0	31.0	C		
Westbound												
Northbound												
T	0.60	0.39	14.7	1.000	1962	0.19	0.5	0.0	15.2	B	12.2	B
R	0.18	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.82	0.39	16.5	1.000	1962	0.36	2.8	0.0	19.3	B	16.6	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 16.8 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

L	0.0	0.00	18.0	13.2	0.00	0.0	0.0	13.7
LTR	0.0	0.00	18.0	10.9	0.00	0.0	0.0	10.9
R	0.0	0.00	18.0	16.8	0.00	0.0	0.0	31.0
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	18.4	14.7	0.00	0.0	0.0	15.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	18.4	16.5	0.00	0.0	0.0	19.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 16.8 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	315	0	559				430	285		588	264	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	3	1	0	3	1	
SL	1770	1863	1583				1862	1583		1862	1583	
LnCapacity	705	742	631				720	1583		720	1583	
Flow Ratio	0.2	0.0	0.4				0.2	0.2		0.3	0.2	
v/c Ratio	0.45	0.00	0.89				0.60	0.18		0.82	0.17	
Grn Ratio	0.40	0.40	0.40				0.39	1.00		0.39	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	3.8	0.0	8.7				5.7			8.8		
kB	0.4	0.5	0.4				0.4	0.7		0.4	0.7	
Q2	0.4	0.0	2.5				0.6	0.2		1.8	0.1	
Q Average	4.2	0.0	11.2				6.4			10.6		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2			1.2		
BOQ	5.0	0.0	13.1				7.5			12.4		
QSRatio												
85th Percentile Output:												
fB%	1.6	1.6	1.5				1.5			1.5		
BOQ	6.5	0.0	16.8				9.8			16.0		
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8	1.6				1.7			1.6		
BOQ	7.2	0.0	18.2				10.8			17.3		
QSRatio												
95th Percentile Output:												
fB%	2.0	2.1	1.8				1.9			1.8		
BOQ	8.3	0.0	20.3				12.2			19.4		
QSRatio												
98th Percentile Output:												
fB%	2.4	2.7	2.1				2.3			2.1		
BOQ	10.2	0.0	23.7				14.7			22.7		
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 SB Ramps

Inter.: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	842	0	591					1488	650		1199	310
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	42.4	0.0				15.7	7.2	0.0	
Yellow	3.6					4.3	4.3		
All Red	2.5					2.5	2.5		

Cycle Length: 85.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	883	1770	1.00	0.50	52.4	D		
LTR	929	1863	0.00	0.50	10.7	B	40.2	D
R	790	1583	0.79	0.50	22.9	C		
Westbound								
Northbound								
T	1773	5074	0.88	0.35	31.7	C	22.1	C
R	1583	1583	0.43	1.00	0.2	A		
Southbound								
T	1773	5074	0.71	0.35	25.3	C	20.1	C
R	1583	1583	0.21	1.00	0.1	A		

Intersection Delay = 26.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Culver at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	842	0	591					1488	650		1199	310
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	222	0	156					392	171		316	82
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	886	0	622					1566	684		1262	326
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	42.4	0.0			15.7	7.2	0.0	
Yellow	3.6				4.3	4.3		
All Red	2.5				2.5	2.5		

Cycle Length: 85.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	842	0	591					1488	650		1199	310
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	886	0	622					1566	684		1262	326
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR R					T	R		T	R
Adj flow	886	0	622					1566	684		1262	326
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound							Northbound							Southbound						
LG	L		LTR	R											T	R						T	R				
So	1900		1900	1900											1900	1900						1900	1900				
Lanes	1		1		0		0		0		0				3	1		0				3	1				
fW	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fHV	0.980		0.980	0.980											0.980	0.980						0.980	0.980				
fG	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fP	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fBB	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fA	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fLU	1.000		1.000	1.000											0.908	1.000						0.908	1.000				
fRT			1.000	0.850											1.000	0.850						1.000	0.850				
fLT	0.950		1.000												1.000							1.000					
Sec.																											
fLpb	1.000		1.000												1.000							1.000					
fRpb			1.000	1.000											1.000	1.000						1.000	1.000				
S	1770		1863	1583											5074	1583						5074	1583				
Sec.																											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	886	1770	#	0.50	0.50	883	1.00
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.50	929	0.00
Right	R	622	1583		0.39	0.50	790	0.79
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1566	5074	#	0.31	0.35	1773	0.88
Right	R	684	1583		0.43	1.00	1583	0.43
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1262	5074		0.25	0.35	1773	0.71
Right	R	326	1583		0.21	1.00	1583	0.21

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.81
Total lost time per cycle, L = 12.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.95

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.00	0.50	21.3	1.000	883	0.50	31.1	0.0	52.4	D		
LTR	0.00	0.50	10.7	1.000	929	0.11	0.0	0.0	10.7	B	40.2	D
R	0.79	0.50	17.6	1.000	790	0.33	5.3	0.0	22.9	C		
Westbound												
Northbound												
T	0.88	0.35	26.0	1.000	1773	0.41	5.7	0.0	31.7	C	22.1	C
R	0.43	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.71	0.35	23.9	1.000	1773	0.28	1.4	0.0	25.3	C	20.1	C
R	0.21	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 26.6 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	85.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	85.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	85.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	21.3	21.3	0.00	0.7	0.0	52.4

LTR	0.0	0.00	21.3	10.7	0.00	0.0	0.0	10.7
R	0.0	0.00	21.3	17.6	0.00	0.0	0.0	22.9
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	27.6	26.0	0.00	0.0	0.0	31.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	27.6	23.9	0.00	0.0	0.0	25.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 26.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	886	0	622				574	684		463	326	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	3	1	0	3	1	
SL	1770	1863	1583				1862	1583		1862	1583	
LnCapacity	883	929	790				650	1583		650	1583	
Flow Ratio	0.5	0.0	0.4				0.3	0.4		0.2	0.2	
v/c Ratio	1.00	0.00	0.79				0.88	0.43		0.71	0.21	
Grn Ratio	0.50	0.50	0.50				0.35	1.00		0.35	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	20.9	0.0	12.1				12.8			9.5		
kB	0.6	0.6	0.6				0.5	0.9		0.5	0.9	
Q2	8.5	0.0	2.0				3.0	0.7		1.2	0.2	
Q Average	29.4	0.0	14.1				15.7			10.7		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.2				1.2			1.2		
BOQ	33.7	0.0	16.5				18.3			12.6		
QSRatio												
85th Percentile Output:												
fB%	1.4	1.6	1.5				1.5			1.5		
BOQ	41.5	0.0	20.9				23.2			16.1		
QSRatio												
90th Percentile Output:												
fB%	1.5	1.8	1.6				1.6			1.6		
BOQ	43.8	0.0	22.5				24.9			17.5		
QSRatio												
95th Percentile Output:												
fB%	1.6	2.1	1.8				1.8			1.8		
BOQ	47.5	0.0	25.0				27.5			19.6		
QSRatio												
98th Percentile Output:												
fB%	1.8	2.7	2.0				2.0			2.1		
BOQ	53.0	0.0	28.7				31.4			22.9		
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 NB Ramps

Inter.: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Volume				1481		921		1739	600		1819	1750
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right	A	A	
Green	21.9	0.0				8.5	11.6	0.0
Yellow	3.6					4.7	4.7	
All Red	2.0					1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1759	4820	0.89	0.36	23.8	C		
							14.9	B
R	1583	1583	0.61	1.00	0.7	A		
Northbound								
T	2224	5074	0.82	0.44	17.5	B	13.0	B
R	1583	1583	0.40	1.00	0.2	A		
Southbound								
T	2965	6765	0.65	0.44	13.7	B	46.7	D
R	1583	1583	1.16	1.00	81.0	F		

Intersection Delay = 28.0 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Jamboree at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1481		921		1739	600		1819	1750
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				390		242		458	158		479	461
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		3	0 1		0 3	1		0 4	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				1559		969		1831	632		1915	1842
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right	A	A	
Green		21.9	0.0			8.5	11.6	0.0
Yellow		3.6				4.7	4.7	
All Red		2.0				1.5	1.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1481		921		1739	600		1819	1750
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				1559		969		1831	632		1915	1842
No. Lanes	0	0	0		3	0 1		0 3	1		0 4	1
Lane group				L		R		T	R		T	R
Adj flow				1559		969		1831	632		1915	1842
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T	R		T	R	
So			1900		1900		1900	1900		1900	1900	
Lanes	0	0	3	0	1	0	3	1	0	4	1	
fW			1.000		1.000		1.000	1.000		1.000	1.000	
fHV			0.980		0.980		0.980	0.980		0.980	0.980	
fG			1.000		1.000		1.000	1.000		1.000	1.000	
fP			1.000		1.000		1.000	1.000		1.000	1.000	
fBB			1.000		1.000		1.000	1.000		1.000	1.000	
fA			1.000		1.000		1.000	1.000		1.000	1.000	
fLU			0.908		1.000		0.908	1.000		0.908	1.000	
fRT					0.850		1.000	0.850		1.000	0.850	
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000	1.000		1.000	1.000	
S			4820		1583		5074	1583		6765	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Westbound							
Prot							
Perm							
Left	L	1559	4820	0.32	0.36	1759	0.89
Prot							
Perm							
Thru							
Right	R	969	1583	0.61	1.00	1583	0.61
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1831	5074	0.36	0.44	2224	0.82
Right	R	632	1583	0.40	1.00	1583	0.40
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1915	6765	0.28	0.44	2965	0.65
Right	R	1842	1583	# 1.16	1.00	1583	1.16

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.16
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.16

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
Westbound												
L	0.89	0.36	17.9	1.000	1759	0.41	5.9	0.0	23.8	C		
											14.9	B
R	0.61	1.00	0.0	0.950	1583	0.20	0.7	0.0	0.7	A		
Northbound												
T	0.82	0.44	14.8	1.000	2224	0.36	2.6	0.0	17.5	B	13.0	B
R	0.40	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.65	0.44	13.2	1.000	2965	0.22	0.5	0.0	13.7	B	46.7	D
R	1.16	1.00	0.0	0.950	1583	0.50	81.0	0.0	81.0	F		

Intersection delay = 28.0 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT				0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.1	17.9	0.00	0.0	0.0	23.8
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.7
Northbound								
	0.0						0.0	
T	0.0	0.00	16.9	14.8	0.00	0.0	0.0	17.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	16.9	13.2	0.00	0.0	0.0	13.7
R	0.0	0.00	0.0	0.0	0.00	64.8	0.0	81.0

Intersection Delay 28.0 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				572	969	672	632	527	1842
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	3	0 1	0 3	1	0 4	1
SL				1769	1583	1862	1583	1862	1583
LnCapacity				645	1583	816	1583	816	1583
Flow Ratio				0.3	0.6	0.4	0.4	0.3	1.2
v/c Ratio				0.89	0.61	0.82	0.40	0.65	1.16
Grn Ratio				0.36	1.00	0.44	1.00	0.44	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00		1.00		1.00	
Q1				9.0		9.8		6.9	
kB				0.4	0.7	0.5	0.7	0.5	0.7
Q2				2.5	1.1	2.0	0.5	0.9	36.8
Q Average				11.5		11.9		7.7	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2		1.2		1.2	
BOQ				13.5		13.9		9.1	
QSRatio									
85th Percentile Output:									
fB%				1.5		1.5		1.5	
BOQ				17.3		17.8		11.8	
QSRatio									
90th Percentile Output:									
fB%				1.6		1.6		1.7	
BOQ				18.7		19.2		12.9	
QSRatio									
95th Percentile Output:									
fB%				1.8		1.8		1.9	
BOQ				20.9		21.5		14.6	
QSRatio									
98th Percentile Output:									
fB%				2.1		2.1		2.3	
BOQ				24.3		24.9		17.4	
QSRatio									

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 NB Ramps

Inter.: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Volume				721		233		3487	970		2499	1140
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right	A	A	
Green	21.6	0.0				77.7	12.7	0.0
Yellow	3.6					4.7	4.7	
All Red	2.0					1.5	1.5	

Cycle Length: 130.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	801	4820	0.95	0.17	73.8	E		
							55.8	E
R	1583	1583	0.15	1.00	0.0+	A		
Northbound								
T	3770	5074	0.97	0.74	25.0	C	19.7	B
R	1583	1583	0.64	1.00	0.9	A		
Southbound								
T	5027	6765	0.52	0.74	7.1	A	5.6	A
R	1583	1583	0.76	1.00	2.2	A		

Intersection Delay = 17.8 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: PM
Intersection: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2015
Project ID: IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				721		233		3487	970		2499	1140
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				190		61		918	255		658	300
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		3	0 1		0 3	1		0 4	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				759		245		3671	1021		2631	1200
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right	A	A	
Green		21.6	0.0			77.7	12.7	0.0
Yellow		3.6				4.7	4.7	
All Red		2.0				1.5	1.5	

Cycle Length: 130.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				721		233		3487	970		2499	1140
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				759		245		3671	1021		2631	1200
No. Lanes	0	0	0		3	0 1		0 3	1		0 4	1
Lane group				L		R		T	R		T	R
Adj flow				759		245		3671	1021		2631	1200
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		T		R
So				1900		1900	1900	1900		1900		1900
Lanes	0	0	0	3	0	1	0 3	1	0	4		1
fW				1.000		1.000	1.000	1.000		1.000		1.000
fHV				0.980		0.980	0.980	0.980		0.980		0.980
fG				1.000		1.000	1.000	1.000		1.000		1.000
fP				1.000		1.000	1.000	1.000		1.000		1.000
fBB				1.000		1.000	1.000	1.000		1.000		1.000
fA				1.000		1.000	1.000	1.000		1.000		1.000
fLU				0.908		1.000	0.908	1.000		0.908		1.000
fRT						0.850	1.000	0.850		1.000		0.850
fLT				0.950			1.000			1.000		
Sec.												
fLpb				1.000			1.000			1.000		
fRpb						1.000	1.000	1.000		1.000		1.000
S				4820		1583	5074	1583		6765		1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	759	4820	#	0.16	0.17	801	0.95
Prot								
Perm								
Thru								
Right	R	245	1583		0.15	1.00	1583	0.15
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	3671	5074	#	0.72	0.74	3770	0.97
Right	R	1021	1583		0.64	1.00	1583	0.64
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2631	6765		0.39	0.74	5027	0.52
Right	R	1200	1583		0.76	1.00	1583	0.76

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.88
Total lost time per cycle, L = 11.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.97

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.95	0.17	53.6	1.000	801	0.46	20.1	0.0	73.8	E		
											55.8	E
R	0.15	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Northbound												
T	0.97	0.74	15.5	1.000	3770	0.48	9.4	0.0	25.0	C	19.7	B
R	0.64	1.00	0.0	0.950	1583	0.22	0.9	0.0	0.9	A		
Southbound												

T	0.52	0.74	7.0	1.000	5027	0.13	0.1	0.0	7.1	A	5.6	A
R	0.76	1.00	0.0	0.950	1583	0.31	2.2	0.0	2.2	A		

Intersection delay = 17.8 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 130.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 130.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	130.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	54.2	53.6	0.00	0.0	0.0	73.8
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Northbound								
	0.0						0.0	
T	0.0	0.00	16.7	15.5	0.00	0.0	0.0	25.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.9
Southbound								
	0.0						0.0	
T	0.0	0.00	16.7	7.0	0.00	0.0	0.0	7.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.2

Intersection Delay 17.8 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				278	245	1347	1021	724	1200
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	3	0 1	0 3	1	0 4	1
SL				1769	1583	1862	1583	1862	1583
LnCapacity				294	1583	1383	1583	1384	1583
Flow Ratio				0.2	0.2	0.7	0.6	0.4	0.8
v/c Ratio				0.95	0.15	0.97	0.64	0.52	0.76
Grn Ratio				0.17	1.00	0.74	1.00	0.74	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00		1.00		1.00	
Q1				9.9		45.2		11.0	
kB				0.4	1.1	1.0	1.1	1.0	1.1
Q2				2.9	0.2	11.2	2.0	1.1	3.3
Q Average				12.8		56.4		12.1	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2		1.1		1.2	
BOQ				15.1		63.5		14.2	
QSRatio									
85th Percentile Output:									
fB%				1.5		1.3		1.5	
BOQ				19.2		76.0		18.2	
QSRatio									
90th Percentile Output:									
fB%				1.6		1.4		1.6	
BOQ				20.7		80.4		19.6	
QSRatio									
95th Percentile Output:									
fB%				1.8		1.5		1.8	
BOQ				23.0		86.1		21.9	
QSRatio									
98th Percentile Output:									
fB%				2.1		1.7		2.1	
BOQ				26.6		96.7		25.4	
QSRatio									

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 SB Ramps

Inter.: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Volume	703	0	1656					1637	620		2994	270
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	57.2	0.0				12.9	36.5	0.0
Yellow	3.5					4.7	4.7	
All Red	1.5					2.0	2.0	

Cycle Length: 125.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	810	1770	0.91	0.46	46.3	D		
LTR	853	1863	0.00	0.46	18.4	B	154.5	F
R	1283	2803	1.36	0.46	200.4	F		
Westbound								
Northbound								
T	3036	6765	0.57	0.45	25.7	C	18.7	B
R	1583	1583	0.41	1.00	0.2	A		
Southbound								
T	3036	6765	1.04	0.45	61.8	E	56.7	E
R	1583	1583	0.18	1.00	0.1	A		

Intersection Delay = 75.1 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Jamboree at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	703	0	1656					1637	620		2994	270
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	185	0	436					431	163		788	71
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L		LTR R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	740	0	1743					1723	653		3152	284
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		57.2	0.0			12.9	36.5	0.0
Yellow		3.5				4.7	4.7	
All Red		1.5				2.0	2.0	

Cycle Length: 125.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	703	0	1656					1637	620		2994	270
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	740	0	1743					1723	653		3152	284
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
Lane group	L		LTR R					T	R		T	R
Adj flow	740	0	1743					1723	653		3152	284
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound				Northbound			Southbound	
LG	L	LTR	R					T	R		T	R
So	1900	1900	1900					1900	1900		1900	1900
Lanes	1	1	2	0	0	0	0	4	1	0	4	1
fW	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980					0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fLU	1.000	1.000	0.885					0.908	1.000		0.908	1.000
fRT		1.000	0.850					1.000	0.850		1.000	0.850
fLT	0.950	1.000						1.000			1.000	
Sec.												
fLpb	1.000	1.000						1.000			1.000	
fRpb		1.000	1.000					1.000	1.000		1.000	1.000
S	1770	1863	2803					6765	1583		6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	740	1770		0.42	0.46	810	0.91
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.46	853	0.00
Right	R	1743	2803	#	0.62	0.46	1283	1.36
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1723	6765		0.25	0.45	3036	0.57
Right	R	653	1583		0.41	1.00	1583	0.41
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	3152	6765	#	0.47	0.45	3036	1.04
Right	R	284	1583		0.18	1.00	1583	0.18

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.09
Total lost time per cycle, L = 11.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.20

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.91	0.46	31.6	1.000	810	0.43	14.7	0.0	46.3	D		
LTR	0.00	0.46	18.4	1.000	853	0.11	0.0	0.0	18.4	B	154.5	F
R	1.36	0.46	33.9	1.000	1283	0.50	166.5	0.0	200.4	F		
Westbound												
Northbound												
T	0.57	0.45	25.5	1.000	3036	0.16	0.3	0.0	25.7	C	18.7	B
R	0.41	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	1.04	0.45	34.4	1.000	3036	0.50	27.3	0.0	61.8	E	56.7	E
R	0.18	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 75.1 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	125.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	33.9	31.6	0.00	0.0	0.0	46.3

LTR	0.0	0.00	33.9	18.4	0.00	0.0	0.0	18.4
R	0.0	0.00	33.9	33.9	0.00	115.0	0.0	200.4
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	34.4	25.5	0.00	0.0	0.0	25.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	34.4	34.4	0.00	29.0	0.0	61.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 75.1 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	740	0	984				474	653		867	284	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	2	0	0	0	0	4	1	0	4	1
SL	1770	1863	1584				1862	1583		1862	1583	
LnCapacity	810	853	724				835	1583		835	1583	
Flow Ratio	0.4	0.0	0.6				0.3	0.4		0.5	0.2	
v/c Ratio	0.91	0.00	1.36				0.57	0.41		1.04	0.18	
Grn Ratio	0.46	0.46	0.46				0.45	1.00		0.45	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	23.9	0.0	34.2				12.2			30.1		
kB	0.7	0.8	0.7				0.8	1.1		0.8	1.1	
Q2	5.0	0.0	34.9				1.0	0.8		11.3	0.2	
Q Average	28.9	0.0	69.1				13.1			41.4		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.1				1.2			1.1		
BOQ	33.2	0.0	77.2				15.4			47.0		
QSRatio												
85th Percentile Output:												
fB%	1.4	1.6	1.3				1.5			1.4		
BOQ	40.9	0.0	91.9				19.6			56.9		
QSRatio												
90th Percentile Output:												
fB%	1.5	1.8	1.4				1.6			1.5		
BOQ	43.2	0.0	97.6				21.1			60.0		
QSRatio												
95th Percentile Output:												
fB%	1.6	2.1	1.5				1.8			1.6		
BOQ	46.9	0.0	105				23.5			64.5		
QSRatio												
98th Percentile Output:												
fB%	1.8	2.7	1.7				2.1			1.7		
BOQ	52.3	0.0	118				27.1			72.0		
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 SB Ramps

Inter.: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Volume	1520	0	1092					2880	1060		2778	640
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	57.2	0.0				12.9	36.5	0.0	
Yellow	3.5					4.7	4.7		
All Red	1.5					2.0	2.0		

Cycle Length: 125.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	810	1770	1.98	0.46	477.2	F		
LTR	853	1863	0.00	0.46	18.4	B	294.4	F
R	1283	2803	0.90	0.46	39.7	D		
Westbound								
Northbound								
T	3036	6765	1.00	0.45	50.4	D	37.2	D
R	1583	1583	0.70	1.00	1.5	A		
Southbound								
T	3036	6765	0.96	0.45	42.8	D	34.8	C
R	1583	1583	0.43	1.00	0.2	A		

Intersection Delay = 103.8 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Jamboree at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	1520	0	1092					2880	1060		2778	640
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	400	0	287					758	279		731	168
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	1600	0	1149					3032	1116		2924	674
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	57.2	0.0			12.9	36.5	0.0	
Yellow	3.5				4.7	4.7		
All Red	1.5				2.0	2.0		

Cycle Length: 125.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	1520	0	1092					2880	1060		2778	640
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	1600	0	1149					3032	1116		2924	674
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	1600	0	1149					3032	1116		2924	674
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound				Northbound			Southbound	
LG	L	LTR	R					T	R		T	R
So	1900	1900	1900					1900	1900		1900	1900
Lanes	1	1	2	0	0	0	0	4	1	0	4	1
fW	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980					0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fLU	1.000	1.000	0.885					0.908	1.000		0.908	1.000
fRT		1.000	0.850					1.000	0.850		1.000	0.850
fLT	0.950	1.000						1.000			1.000	
Sec.												
fLpb	1.000	1.000						1.000			1.000	
fRpb		1.000	1.000					1.000	1.000		1.000	1.000
S	1770	1863	2803					6765	1583		6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	1600	1770	#	0.90	0.46	810	1.98
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.46	853	0.00
Right	R	1149	2803		0.41	0.46	1283	0.90
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	3032	6765	#	0.45	0.45	3036	1.00
Right	R	1116	1583		0.70	1.00	1583	0.70
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2924	6765		0.43	0.45	3036	0.96
Right	R	674	1583		0.43	1.00	1583	0.43

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.35
Total lost time per cycle, L = 11.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.49

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.98	0.46	33.9	1.000	810	0.50	443.3	0.0	477.2	F		
LTR	0.00	0.46	18.4	1.000	853	0.11	0.0	0.0	18.4	B	294.4	F
R	0.90	0.46	31.2	1.000	1283	0.42	8.5	0.0	39.7	D		
Westbound												
Northbound												
T	1.00	0.45	34.4	1.000	3036	0.50	16.0	0.0	50.4	D	37.2	D
R	0.70	1.00	0.0	0.950	1583	0.27	1.5	0.0	1.5	A		
Southbound												

T	0.96	0.45	33.4	1.000	3036	0.47	9.3	0.0	42.8	D	34.8	C
R	0.43	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 103.8 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	125.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	125.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	125.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	33.9	33.9	0.00	197.5	0.0	477.2

LTR	0.0	0.00	33.9	18.4	0.00	0.0	0.0	18.4
R	0.0	0.00	33.9	31.2	0.00	0.0	0.0	39.7
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	34.4	34.4	0.00	0.0	0.0	50.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.5
Southbound								
	0.0						0.0	
T	0.0	0.00	34.4	33.4	0.00	0.0	0.0	42.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 103.8 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	1600	0	649				834	1116		805	674	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	2	0	0	0	4	1	0	4	1	
SL	1770	1863	1584				1862	1583		1862	1583	
LnCapacity	810	853	724				835	1583		835	1583	
Flow Ratio	0.9	0.0	0.4				0.4	0.7		0.4	0.4	
v/c Ratio	1.98	0.00	0.90				1.00	0.70		0.96	0.43	
Grn Ratio	0.46	0.46	0.46				0.45	1.00		0.45	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	55.6	0.0	20.7				28.9			27.2		
kB	0.7	0.8	0.7				0.8	1.1		0.8	1.1	
Q2	100.2		0.0	4.2				8.8	2.5		7.0	
Q Average	155.8		0.0	24.9				37.7			34.2	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.2				1.1			1.1		
BOQ	172	0.0	28.7				43.0			39.1		
QSRatio												
85th Percentile Output:												
fB%	1.3	1.6	1.4				1.4			1.4		
BOQ	203	0.0	35.6				52.3			47.7		
QSRatio												
90th Percentile Output:												
fB%	1.4	1.8	1.5				1.5			1.5		
BOQ	218	0.0	37.7				55.1			50.3		
QSRatio												
95th Percentile Output:												
fB%	1.5	2.1	1.7				1.6			1.6		
BOQ	234	0.0	41.1				59.4			54.4		
QSRatio												
98th Percentile Output:												
fB%	1.7	2.7	1.8				1.8			1.8		
BOQ	265	0.0	46.0				66.2			60.6		
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Volume				931		660		2350	358	222	1009	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	24.8	0.0			6.0	16.3	9.5	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1065	3437	0.92	0.31	39.3	D		
							35.7	D
R	869	2803	0.80	0.31	30.7	C		
Northbound								
T	2714	6765	0.91	0.40	27.8	C	26.4	C
R	1125	2803	0.34	0.40	16.7	B		
Southbound								
L	258	3437	0.91	0.08	69.4	E		
T	3662	6765	0.29	0.54	10.0+	B	20.7	C

Intersection Delay = 27.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: AM
Intersection: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2015
Project ID: IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				931	660			2350	358	222	1009	
% Heavy Veh				2	2			2	2	2	2	
PHF				0.95	0.95			0.95	0.95	0.95	0.95	
PK 15 Vol				245	174			618	94	58	266	
Hi Ln Vol												
% Grade				0				0			0	
Ideal Sat				1900	1900			1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			
Adj Flow				980		695		2474	377	234	1062	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	
Peds Bikes	0			0			0					
Buses				0		0		0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type				3		3		3	3	3	3	
Unit Ext.				3.0		3.0		3.0	3.0	3.0	3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g				2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	24.8	0.0			6.0	16.3	9.5	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				931		660		2350	358	222	1009	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow				980		695		2474	377	234	1062	
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
Lane group				L		R		T	R	L	T	
Adj flow				980		695		2474	377	234	1062	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R	L	T		
So				1900		1900	1900	1900	1900	1900		
Lanes	0	0	0	2	0	2	0	4	2	2	4	0
fW				1.000		1.000		1.000	1.000	1.000	1.000	
fHV				0.980		0.980		0.980	0.980	0.980	0.980	
fG				1.000		1.000		1.000	1.000	1.000	1.000	
fP				1.000		1.000		1.000	1.000	1.000	1.000	
fBB				1.000		1.000		1.000	1.000	1.000	1.000	
fA				1.000		1.000		1.000	1.000	1.000	1.000	
fLU				0.971		0.885		0.908	0.885	0.971	0.908	
fRT						0.850		1.000	0.850		1.000	
fLT				0.950				1.000		0.950	1.000	
Sec.												
fLpb				1.000				1.000		1.000	1.000	
fRpb						1.000		1.000	1.000		1.000	
S				3437		2803		6765	2803	3437	6765	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	980	3437	#	0.29	0.31	1065	0.92
Prot								
Perm								
Thru								
Right	R	695	2803		0.25	0.31	869	0.80
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2474	6765	#	0.37	0.40	2714	0.91
Right	R	377	2803		0.13	0.40	1125	0.34
Southbound								
Prot								
Perm								
Left	L	234	3437	#	0.07	0.08	258	0.91
Prot								
Perm								
Thru	T	1062	6765		0.16	0.54	3662	0.29
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.72
Total lost time per cycle, L = 17.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.91

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.92	0.31	26.6	1.000	1065	0.44	12.6	0.0	39.3	D		
											35.7	D
R	0.80	0.31	25.3	1.000	869	0.34	5.4	0.0	30.7	C		
Northbound												
T	0.91	0.40	22.6	1.000	2714	0.43	5.2	0.0	27.8	C	26.4	C
R	0.34	0.40	16.6	1.000	1125	0.11	0.2	0.0	16.7	B		
Southbound												
L	0.91	0.08	36.7	1.000	258	0.43	32.7	0.0	69.4	E		

T 0.29 0.54 10.0 1.000 3662 0.11 0.0 0.0 10.0+ B 20.7 C

Intersection delay = 27.8 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	27.6	26.6	0.00	0.0	0.0	39.3
	0.0						0.0	
R	0.0	0.00	27.6	25.3	0.00	0.0	0.0	30.7
Northbound								
	0.0						0.0	
T	0.0	0.00	24.0	22.6	0.00	0.0	0.0	27.8
R	0.0	0.00	24.0	16.6	0.00	0.0	0.0	16.7
Southbound								
L	0.0	0.00	37.0	36.7	0.00	0.0	0.0	69.4
T	0.0	0.00	18.4	10.0	0.00	0.0	0.0	10.0+
	0.0						0.0	

Intersection Delay 27.8 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup				L	R	T	R	L	T	
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate				504	392	681	212	120	292	
So				1900	1900	1900	1900	1900	1900	
No.Lanes	0	0	0	2	0 2	0 4	2	2	4	0
SL				1770	1584	1862	1584	1770	1862	
LnCapacity				548	490	747	635	132	1008	
Flow Ratio				0.3	0.2	0.4	0.1	0.1	0.2	
v/c Ratio				0.92	0.80	0.91	0.33	0.91	0.29	
Grn Ratio				0.31	0.31	0.40	0.40	0.08	0.54	
I Factor				1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00	1.00	
Q1				10.8	8.0	14.3	3.3	2.6	3.5	
kB				0.4	0.4	0.5	0.5	0.2	0.6	
Q2				3.2	1.5	3.8	0.2	1.1	0.3	
Q Average				14.0	9.5	18.1	3.5	3.8	3.8	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage				0	0	0	0	0	0	
Q S Ratio										
70th Percentile Output:										
fB%				1.2	1.2	1.2	1.2	1.2	1.2	
BOQ				16.4	11.2	21.1	4.2	4.5	4.5	
QSRatio										
85th Percentile Output:										
fB%				1.5	1.5	1.5	1.6	1.6	1.6	
BOQ				20.9	14.4	26.5	5.5	5.9	5.9	
QSRatio										
90th Percentile Output:										
fB%				1.6	1.6	1.6	1.7	1.7	1.7	
BOQ				22.4	15.6	28.3	6.1	6.5	6.6	
QSRatio										
95th Percentile Output:										
fB%				1.8	1.9	1.7	2.0	2.0	2.0	
BOQ				24.9	17.6	31.1	7.0	7.5	7.5	
QSRatio										
98th Percentile Output:										
fB%				2.0	2.2	1.9	2.5	2.4	2.4	
BOQ				28.6	20.7	35.3	8.6	9.2	9.3	
QSRatio										

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Volume				591		279		1964	993	570	1623	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	15.6	0.0			16.4	10.0	19.6	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 85.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	631	3437	0.99	0.18	66.7	E		
							55.9	E
R	514	2803	0.57	0.18	33.2	C		
Northbound								
T	2857	6765	0.72	0.42	21.4	C	24.5	C
R	1184	2803	0.88	0.42	30.7	C		
Southbound								
L	663	3437	0.90	0.19	49.6	D		
T	4576	6765	0.37	0.68	6.0	A	17.3	B

Intersection Delay = 26.4 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Macarthur at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				591		279		1964	993	570	1623	
% Heavy Veh				2		2		2	2	2	2	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol				156		73		517	261	150	427	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			
Adj Flow				622		294		2067	1045	600	1708	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	
Peds Bikes	0			0			0					
Buses				0		0		0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type				3		3		3	3	3	3	
Unit Ext.				3.0		3.0		3.0	3.0	3.0	3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g				2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	15.6	0.0			16.4	10.0	19.6	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 85.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				591		279		1964	993	570	1623	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow				622		294		2067	1045	600	1708	
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
Lane group				L		R		T	R	L	T	
Adj flow				622		294		2067	1045	600	1708	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		L	T	
So				1900		1900	1900	1900		1900	1900	
Lanes	0	0	0	2	0	2	0 4	2		2	4	0
fW				1.000		1.000	1.000	1.000		1.000	1.000	
fHV				0.980		0.980	0.980	0.980		0.980	0.980	
fG				1.000		1.000	1.000	1.000		1.000	1.000	
fP				1.000		1.000	1.000	1.000		1.000	1.000	
fBB				1.000		1.000	1.000	1.000		1.000	1.000	
fA				1.000		1.000	1.000	1.000		1.000	1.000	
fLU				0.971		0.885	0.908	0.885		0.971	0.908	
fRT						0.850	1.000	0.850			1.000	
fLT				0.950			1.000			0.950	1.000	
Sec.												
fLpb				1.000			1.000			1.000	1.000	
fRpb						1.000	1.000	1.000			1.000	
S				3437		2803	6765	2803		3437	6765	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	622	3437	#	0.18	0.18	631	0.99
Prot								
Perm								
Thru								
Right	R	294	2803		0.10	0.18	514	0.57
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2067	6765		0.31	0.42	2857	0.72
Right	R	1045	2803	#	0.37	0.42	1184	0.88
Southbound								
Prot								
Perm								
Left	L	600	3437	#	0.17	0.19	663	0.90
Prot								
Perm								
Thru	T	1708	6765		0.25	0.68	4576	0.37
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.73
Total lost time per cycle, L = 17.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.91

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.99	0.18	34.6	1.000	631	0.49	32.1	0.0	66.7	E		
											55.9	E
R	0.57	0.18	31.7	1.000	514	0.17	1.5	0.0	33.2	C		
Northbound												
T	0.72	0.42	20.4	1.000	2857	0.28	0.9	0.0	21.4	C	24.5	C
R	0.88	0.42	22.6	1.000	1184	0.41	8.1	0.0	30.7	C		
Southbound												
L	0.90	0.19	33.5	1.000	663	0.43	16.0	0.0	49.6	D		

T	0.37	0.68	6.0	1.000	4576	0.11	0.1	0.0	6.0	A	17.3	B

Intersection delay = 26.4 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 85.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 85.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	85.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	34.7	34.6	0.00	0.0	0.0	66.7
	0.0						0.0	
R	0.0	0.00	34.7	31.7	0.00	0.0	0.0	33.2
Northbound								
	0.0						0.0	
T	0.0	0.00	24.5	20.4	0.00	0.0	0.0	21.4
R	0.0	0.00	24.5	22.6	0.00	0.0	0.0	30.7
Southbound								
L	0.0	0.00	34.3	33.5	0.00	0.0	0.0	49.6
T	0.0	0.00	13.8	6.0	0.00	0.0	0.0	6.0
	0.0						0.0	

Intersection Delay 26.4 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L		R	T		R	L	T	
Init Queue				0.0		0.0	0.0		0.0	0.0	0.0	
Flow Rate				320		166	569		590	308	470	
So				1900		1900	1900		1900	1900	1900	
No.Lanes	0	0	0	2	0	2	0	4	2	2	4	0
SL				1770		1584	1862		1584	1770	1862	
LnCapacity				324		290	786		668	341	1259	
Flow Ratio				0.2		0.1	0.3		0.4	0.2	0.3	
v/c Ratio				0.99		0.57	0.72		0.88	0.90	0.37	
Grn Ratio				0.18		0.18	0.42		0.42	0.19	0.68	
I Factor				1.000			1.000			1.000		
AT or PVG				3		3	3		3	3	3	
Pltn Ratio				1.00		1.00	1.00		1.00	1.00	1.00	
PF2				1.00		1.00	1.00		1.00	1.00	1.00	
Q1				7.5		3.6	11.2		12.8	7.1	4.8	
kB				0.3		0.3	0.6		0.5	0.3	0.8	
Q2				3.4		0.4	1.4		3.0	2.1	0.5	
Q Average				11.0		4.0	12.6		15.9	9.3	5.3	
Q Spacing				25.0		25.0	25.0		25.0	25.0	25.0	
Q Storage				0		0	0		0	0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.2		1.2	1.2		1.2	1.2	1.2	
BOQ				12.9		4.8	14.8		18.5	10.9	6.2	
QSRatio												
85th Percentile Output:												
fB%				1.5		1.6	1.5		1.5	1.5	1.6	
BOQ				16.6		6.2	18.9		23.4	14.1	8.2	
QSRatio												
90th Percentile Output:												
fB%				1.6		1.7	1.6		1.6	1.7	1.7	
BOQ				17.9		6.9	20.3		25.1	15.3	9.0	
QSRatio												
95th Percentile Output:												
fB%				1.8		2.0	1.8		1.7	1.9	1.9	
BOQ				20.0		7.9	22.7		27.7	17.2	10.2	
QSRatio												
98th Percentile Output:												
fB%				2.1		2.4	2.1		2.0	2.2	2.4	
BOQ				23.4		9.7	26.2		31.6	20.3	12.4	
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				984	281	1136		1535	390	174	1234	505
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
WB Left	A				SB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right	A	A	A	
Green	19.7	0.0				4.5	7.1	7.0	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1151	3505	0.90	0.33	29.0	C		
T	624	1900	0.47	0.33	16.6	B	14.7	B
R	1615	1615	0.74	1.00	1.9	A		
Northbound								
T	2278	6765	0.71	0.34	18.4	B	19.7	B
R	533	1583	0.77	0.34	24.7	C		
Southbound								
L	258	3437	0.71	0.08	35.8	D		
T	3236	6765	0.40	0.48	10.2	B	13.9	B
R	757	1583	0.70	0.48	15.2	B		

Intersection Delay = 16.0 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Macarthur at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				984	281	1136		1535	390	174	1234	505
% Heavy Veh				0	0	0		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				259	74	299		404	103	46	325	133
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L		T	R		T	R	L		T	R
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0
Adj Flow				1036	296	1196		1616	411	183	1299	532
%InSharedLn												
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0	0	0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
WB Left		A			SB Left	A		
Thru		A			Thru	A	A	A
Right		A			Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green		19.7	0.0			4.5	7.1	7.0	0.0
Yellow		4.0				3.2	4.3	4.3	
All Red		1.5				0.8	1.8	1.8	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				984	281	1136		1535	390	174	1234	505
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				1036	296	1196		1616	411	183	1299	532
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
Lane group				L		T	R		T	R	L		T	R
Adj flow				1036	296	1196		1616	411	183	1299	532
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				1.000	1.000	1.000		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3505	1900	1615		6765	1583	3437	6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	1036	3505		0.30	0.33	1151	0.90
Prot								
Perm								
Thru	T	296	1900		0.16	0.33	624	0.47
Right	R	1196	1615	#	0.74	1.00	1615	0.74
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1616	6765		0.24	0.34	2278	0.71
Right	R	411	1583		0.26	0.34	533	0.77
Southbound								
Prot								
Perm								
Left	L	183	3437		0.05	0.08	258	0.71
Prot								
Perm								
Thru	T	1299	6765		0.19	0.48	3236	0.40
Right	R	532	1583		0.34	0.48	757	0.70

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.74
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.74

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.90	0.33	19.2	1.000	1151	0.42	9.8	0.0	29.0	C		
T	0.47	0.33	16.0	1.000	624	0.11	0.6	0.0	16.6	B	14.7	B
R	0.74	1.00	0.0	0.950	1615	0.30	1.9	0.0	1.9	A		
Northbound												
T	0.71	0.34	17.3	1.000	2278	0.27	1.0	0.0	18.4	B	19.7	B
R	0.77	0.34	17.8	1.000	533	0.32	6.9	0.0	24.7	C		
Southbound												
L	0.71	0.08	27.1	1.000	258	0.27	8.7	0.0	35.8	D		

T	0.40	0.48	10.1	1.000	3236	0.11	0.1	0.0	10.2	B	13.9 B
R	0.70	0.48	12.3	1.000	757	0.27	3.0	0.0	15.2	B	

Intersection delay = 16.0 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	20.1	19.2	0.00	0.0	0.0	29.0
T	0.0	0.00	20.1	16.0	0.00	0.0	0.0	16.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.9
Northbound								
	0.0						0.0	
T	0.0	0.00	19.9	17.3	0.00	0.0	0.0	18.4
R	0.0	0.00	19.9	17.8	0.00	0.0	0.0	24.7
Southbound								
L	0.0	0.00	27.7	27.1	0.00	0.0	0.0	35.8
T	0.0	0.00	15.6	10.1	0.00	0.0	0.0	10.2
R	0.0	0.00	15.6	12.3	0.00	0.0	0.0	15.2

Intersection Delay 16.0 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound		
LaneGroup				L	T	R	T	R	L	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				533	296	1196	444	411	94	357	532
So				1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	1	1	4	1	2	4	1
SL				1805	1900	1615	1862	1583	1770	1862	1583
LnCapacity				592	624	1615	627	533	132	890	757
Flow Ratio				0.3	0.2	0.7	0.2	0.3	0.1	0.2	0.3
v/c Ratio				0.90	0.47	0.74	0.71	0.77	0.71	0.40	0.70
Grn Ratio				0.33	0.33	1.00	0.34	0.34	0.08	0.48	0.48
I Factor					1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1				8.5	3.9		6.4	6.1	1.5	3.8	7.0
kB				0.4	0.4	0.7	0.4	0.4	0.2	0.5	0.5
Q2				2.6	0.4	2.0	1.0	1.2	0.4	0.3	1.0
Q Average				11.1	4.3		7.4	7.3	1.9	4.2	8.0
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0	0
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2		1.2	1.2	1.2	1.2	1.2
BOQ				13.1	5.1		8.8	8.6	2.3	5.0	9.5
QSRatio											
85th Percentile Output:											
fB%				1.5	1.6		1.5	1.5	1.6	1.6	1.5
BOQ				16.7	6.7		11.4	11.2	3.0	6.5	12.3
QSRatio											
90th Percentile Output:											
fB%				1.6	1.7		1.7	1.7	1.8	1.7	1.7
BOQ				18.1	7.4		12.4	12.2	3.4	7.2	13.4
QSRatio											
95th Percentile Output:											
fB%				1.8	2.0		1.9	1.9	2.0	2.0	1.9
BOQ				20.2	8.5		14.0	13.9	3.9	8.3	15.1
QSRatio											
98th Percentile Output:											
fB%				2.1	2.4		2.3	2.3	2.6	2.4	2.2
BOQ				23.6	10.4		16.8	16.6	4.9	10.1	17.9
QSRatio											

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				656	287	640		2300	678	582	1314	383
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	15.5	0.0				7.2	10.3	5.3	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	888	3437	0.78	0.26	25.1	C		
T	481	1863	0.63	0.26	22.3	C	14.5	B
R	1583	1583	0.43	1.00	0.2	A		
Northbound								
T	2447	6765	0.99	0.36	34.7	C	59.6	E
R	573	1583	1.25	0.36	144.0	F		
Southbound								
L	412	3437	1.49	0.12	258.5	F		
T	3709	6765	0.37	0.55	7.8	A	72.0	E
R	868	1583	0.46	0.55	8.6	A		

Intersection Delay = 53.3 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Macarthur at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				656	287	640		2300	678	582	1314	383
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				173	76	168		605	178	153	346	101
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L		T	R		T	R	L		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0	12.0	12.0	12.0	
RTOR Vol						0				0				0
Adj Flow				691	302	674			2421	714	613	1383	403	
%InSharedLn														
Prop LTs					0.000				0.000			0.000		
Prop RTs					0.000	1.000			0.000	1.000		0.000	1.000	
Peds Bikes	0				0				0			0		
Buses				0	0	0			0	0	0	0	0	
%InProtPhase														

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3			3	3	3	3	3	3
Unit Ext.				3.0	3.0	3.0			3.0	3.0	3.0	3.0	3.0	3.0
I Factor					1.000				1.000			1.000		
Lost Time				2.0	2.0	2.0			2.0	2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0			2.0	2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2				3.2			3.2		

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
WB Left		A			SB Left	A		
Thru		A			Thru	A	A	A
Right		A			Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green		15.5	0.0			7.2	10.3	5.3	0.0
Yellow		4.0				3.2	4.3	4.3	
All Red		1.5				0.8	1.8	1.8	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				656	287	640		2300	678	582	1314	383
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				691	302	674		2421	714	613	1383	403
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
Lane group				L		T	R		T	R	L		T	R
Adj flow				691	302	674			2421	714	613	1383	403	
Prop LTs					0.000				0.000			0.000		
Prop RTs					0.000	1.000			0.000	1.000		0.000	1.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	691	3437	#	0.20	0.26	888	0.78
Prot								
Perm								
Thru	T	302	1863		0.16	0.26	481	0.63
Right	R	674	1583		0.43	1.00	1583	0.43
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2421	6765		0.36	0.36	2447	0.99
Right	R	714	1583	#	0.45	0.36	573	1.25
Southbound								
Prot								
Perm								
Left	L	613	3437	#	0.18	0.12	412	1.49
Prot								
Perm								
Thru	T	1383	6765		0.20	0.55	3709	0.37
Right	R	403	1583		0.25	0.55	868	0.46

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.83
Total lost time per cycle, L = 15.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.12

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.78	0.26	20.7	1.000	888	0.33	4.5	0.0	25.1	C		
T	0.63	0.26	19.7	1.000	481	0.21	2.6	0.0	22.3	C	14.5	B
R	0.43	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Northbound												
T	0.99	0.36	19.0	1.000	2447	0.49	15.7	0.0	34.7	C	59.6	E
R	1.25	0.36	19.1	1.000	573	0.50	124.8	0.0	144.0	F		
Southbound												
L	1.49	0.12	26.4	1.000	412	0.50	232.1	0.0	258.5	F		

T	0.37	0.55	7.7	1.000	3709	0.11	0.1	0.0	7.8	A	72.0	E
R	0.46	0.55	8.2	1.000	868	0.11	0.4	0.0	8.6	A		

Intersection delay = 53.3 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	22.2	20.7	0.00	0.0	0.0	25.1
T	0.0	0.00	22.2	19.7	0.00	0.0	0.0	22.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Northbound								
	0.0						0.0	
T	0.0	0.00	19.1	19.0	0.00	0.0	0.0	34.7
R	0.0	0.00	19.1	19.1	0.00	35.2	0.0	144.0
Southbound								
L	0.0	0.00	26.4	26.4	0.00	50.3	0.0	258.5
T	0.0	0.00	13.5	7.7	0.00	0.0	0.0	7.8
R	0.0	0.00	13.5	8.2	0.00	0.0	0.0	8.6

Intersection Delay 53.3 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound		
LaneGroup				L	T	R	T	R	L	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				355	302	674	666	714	315	380	403
So				1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	1	1	4	1	2	4	1
SL				1770	1863	1583	1862	1583	1770	1862	1583
LnCapacity				457	481	1583	673	573	212	1021	868
Flow Ratio				0.2	0.2	0.4	0.4	0.5	0.2	0.2	0.3
v/c Ratio				0.78	0.63	0.43	0.99	1.25	1.49	0.37	0.46
Grn Ratio				0.26	0.26	1.00	0.36	0.36	0.12	0.55	0.55
I Factor					1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1				5.5	4.5		11.0	11.9	5.2	3.6	4.1
kB				0.3	0.3	0.7	0.4	0.4	0.2	0.5	0.5
Q2				1.1	0.6	0.5	5.5	19.4	13.5	0.3	0.4
Q Average				6.6	5.0		16.6	31.3	18.7	3.9	4.5
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0	0
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2		1.2	1.1	1.2	1.2	1.2
BOQ				7.8	6.0		19.3	35.9	21.8	4.7	5.3
QSRatio											
85th Percentile Output:											
fB%				1.5	1.6		1.5	1.4	1.5	1.6	1.6
BOQ				10.1	7.8		24.4	44.0	27.4	6.1	7.0
QSRatio											
90th Percentile Output:											
fB%				1.7	1.7		1.6	1.5	1.6	1.7	1.7
BOQ				11.1	8.6		26.1	46.4	29.2	6.8	7.7
QSRatio											
95th Percentile Output:											
fB%				1.9	2.0		1.7	1.6	1.7	2.0	2.0
BOQ				12.6	9.8		28.8	50.3	32.1	7.8	8.8
QSRatio											
98th Percentile Output:											
fB%				2.3	2.4		2.0	1.8	1.9	2.4	2.4
BOQ				15.1	12.0		32.8	56.0	36.3	9.6	10.8
QSRatio											

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 NB Ramps

Inter.: Baker at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
LGConfig	L	T			T	R		LTR				
Volume	524	1226			319	181	341	305	344			
Lane Width	12.0	12.0			12.0	12.0		12.0				
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	32.9	6.1	5.0	0.0		32.3	0.0		
Yellow	3.2	4.0	4.0			3.5			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	613	1770	0.90	0.35	45.9	D		
T	1986	3547	0.65	0.56	15.2	B	24.4	C
Westbound								
T	601	3547	0.56	0.17	37.4	D	40.5	D
R	268	1583	0.71	0.17	45.9	D		
Northbound								
LTR	1124	3305	0.93	0.34	43.2	D	43.2	D
Southbound								

Intersection Delay = 32.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Baker at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 NB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	524	1226			319	181	341	305	344			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	138	323			84	48	90	80	91			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900		1900				
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
LGConfig	L	T			T	R		LTR				
Lane Width	12.0	12.0			12.0	12.0		12.0				
RTOR Vol					0				0			
Adj Flow	552	1291			336	191		1042				
%InSharedLn												
Prop LTs		0.000			0.000			0.345				
Prop RTs		0.000			0.000	1.000		0.347				
Peds Bikes					0			0			0	
Buses	0	0			0	0		0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0		0.0				
Arriv. Type	3	3			3	3		3				
Unit Ext.	3.0	3.0			3.0	3.0		3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0		2.0				
Ext of g	2.0	2.0			2.0	2.0		2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	32.9	6.1	5.0	0.0		32.3	0.0	
Yellow	3.2	4.0	4.0			3.5		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	524	1226			319	181	341	305	344			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	552	1291			336	191	359	321	362			
No. Lanes	1	2	0	0	2	1	0	2	0	0	0	0
Lane group	L	T			T	R		LTR				
Adj flow	552	1291			336	191		1042				
Prop LTs		0.000			0.000			0.345				
Prop RTs		0.000			0.000	1.000		0.347				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound			Northbound			Southbound			
LG	L	T			T	R		LTR						
So	1900	1900			1900	1900		1900						
Lanes	1	2	0	0	2	1	0	2	0	0	0	0		
fW	1.000	1.000			1.000	1.000		1.000						
fHV	0.980	0.980			0.980	0.980		0.980						
fG	1.000	1.000			1.000	1.000		1.000						
fP	1.000	1.000			1.000	1.000		1.000						
fBB	1.000	1.000			1.000	1.000		1.000						
fA	1.000	1.000			1.000	1.000		1.000						
fLU	1.000	0.952			0.952	1.000		0.952						
fRT		1.000			1.000	0.850		0.948						
fLT	0.950	1.000			1.000			0.983						
Sec.														
fLpb	1.000	1.000			1.000			1.000						
fRpb		1.000			1.000	1.000		1.000						
S	1770	3547			3547	1583		3305						
Sec.														

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	552	1770	#	0.31	0.35	613	0.90
Prot								
Perm								
Thru	T	1291	3547		0.36	0.56	1986	0.65
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	336	3547		0.09	0.17	601	0.56
Right	R	191	1583	#	0.12	0.17	268	0.71
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	1042	3305	#	0.32	0.34	1124	0.93
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.75
Total lost time per cycle, L = 13.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.87

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.90	0.35	29.5	1.000	613	0.42	16.4	0.0	45.9	D		
T	0.65	0.56	14.5	1.000	1986	0.23	0.8	0.0	15.2	B	24.4	C
Westbound												
T	0.56	0.17	36.2	1.000	601	0.16	1.2	0.0	37.4	D	40.5	D
R	0.71	0.17	37.3	1.000	268	0.28	8.6	0.0	45.9	D		
Northbound												
LTR	0.93	0.34	30.2	1.000	1124	0.44	12.9	0.0	43.2	D	43.2	D
Southbound												

Intersection delay = 32.6 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.345	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	31.0	29.5	0.00	0.0	0.0	45.9

T	0.0	0.00	20.9	14.5	0.00	0.0	0.0	15.2
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	39.5	36.2	0.00	0.0	0.0	37.4
R	0.0	0.00	39.5	37.3	0.00	0.0	0.0	45.9
Northbound								
	0.0						0.0	
LTR	0.0	0.00	31.4	30.2	0.00	0.0	0.0	43.2
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 32.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound			Southbound		
LaneGroup	L	T		T	R	LTR					
Init Queue	0.0	0.0		0.0	0.0	0.0					
Flow Rate	552	678		176	191	547					
So	1900	1900		1900	1900	1900					
No.Lanes	1	2	0	0	2	1	0	2	0	0	0	0
SL	1770	1862		1862	1583	1735					
LnCapacity	613	1043		315	268	590					
Flow Ratio	0.3	0.4		0.1	0.1	0.3					
v/c Ratio	0.90	0.65		0.56	0.71	0.93					
Grn Ratio	0.35	0.56		0.17	0.17	0.34					
I Factor		1.000		1.000		1.000					
AT or PVG	3	3		3	3	3					
Pltn Ratio	1.00	1.00		1.00	1.00	1.00					
PF2	1.00	1.00		1.00	1.00	1.00					
Q1	13.8	12.4		4.3	4.8	13.9					
kB	0.5	0.7		0.4	0.3	0.5					
Q2	3.3	1.3		0.4	0.7	3.8					
Q Average	17.2	13.7		4.7	5.5	17.8					
Q Spacing	25.0	25.0		25.0	25.0	25.0					
Q Storage	0	0		0	0	0					
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2		1.2	1.2	1.2					
BOQ	20.0	16.0		5.6	6.5	20.7					
QSRatio											
85th Percentile Output:											
fB%	1.5	1.5		1.6	1.5	1.5					
BOQ	25.2	20.4		7.3	8.5	26.0					
QSRatio											
90th Percentile Output:											
fB%	1.6	1.6		1.7	1.7	1.6					
BOQ	27.0	21.9		8.1	9.4	27.8					
QSRatio											
95th Percentile Output:											
fB%	1.7	1.8		2.0	1.9	1.7					
BOQ	29.7	24.4		9.2	10.7	30.6					
QSRatio											
98th Percentile Output:											
fB%	2.0	2.0		2.4	2.4	2.0					
BOQ	33.8	28.1		11.3	13.0	34.7					
QSRatio											

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 NB Ramps

Inter.: Baker at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	2	0	0	2	1	0	2	0	0	0	0
LGConfig	L	T			T	R		LTR				
Volume	285	495			1009	400	351	375	345			
Lane Width	12.0	12.0			12.0	12.0		12.0				
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	8.0	14.7	5.7	0.0		27.7	0.0		
Yellow	3.2	4.0	4.0			3.5			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 74.8 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	368	3437	0.84	0.11	48.9	D		
T	1783	3547	0.30	0.50	11.0	B	24.8	C
Westbound								
T	1204	3547	0.91	0.34	34.1	C	33.3	C
R	538	1583	0.81	0.34	31.5	C		
Northbound								
LTR	1230	3321	0.95	0.37	37.7	D	37.7	D
Southbound								

Intersection Delay = 32.7 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Baker at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 NB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	285	495			1009	400	351	375	345			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.92	0.92			0.92	0.92	0.92	0.92	0.92			
PK 15 Vol	77	135			274	109	95	102	94			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900		1900				
ParkExist												
NumPark												
No. Lanes	2	2	0	0	2	1	0	2	0	0	0	0
LGConfig	L	T			T	R		LTR				
Lane Width	12.0	12.0			12.0	12.0		12.0				
RTOR Vol					0				0			
Adj Flow	310	538			1097	435		1165				
%InSharedLn												
Prop LTs		0.000			0.000			0.328				
Prop RTs		0.000			0.000	1.000		0.322				
Peds Bikes					0			0			0	
Buses	0	0			0	0		0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0		0.0				
Arriv. Type	3	3			3	3		3				
Unit Ext.	3.0	3.0			3.0	3.0		3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0		2.0				
Ext of g	2.0	2.0			2.0	2.0		2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	8.0	14.7	5.7	0.0		27.7	0.0	
Yellow	3.2	4.0	4.0			3.5		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 74.8 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	285	495			1009	400	351	375	345			
PHF	0.92	0.92			0.92	0.92	0.92	0.92	0.92			
Adj flow	310	538			1097	435	382	408	375			
No. Lanes	2	2	0	0	2	1	0	2	0	0	0	0
Lane group	L	T			T	R		LTR				
Adj flow	310	538			1097	435		1165				
Prop LTs		0.000			0.000			0.328				
Prop RTs		0.000			0.000	1.000		0.322				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound			Northbound			Southbound		
LG	L	T			T	R		LTR					
So	1900	1900			1900	1900		1900					
Lanes	2	2	0	0	2	1	0	2	0	0	0	0	
fW	1.000	1.000			1.000	1.000		1.000					
fHV	0.980	0.980			0.980	0.980		0.980					
fG	1.000	1.000			1.000	1.000		1.000					
fP	1.000	1.000			1.000	1.000		1.000					
fBB	1.000	1.000			1.000	1.000		1.000					
fA	1.000	1.000			1.000	1.000		1.000					
fLU	0.971	0.952			0.952	1.000		0.952					
fRT		1.000			1.000	0.850		0.952					
fLT	0.950	1.000			1.000			0.984					
Sec.													
fLpb	1.000	1.000			1.000			1.000					
fRpb		1.000			1.000	1.000		1.000					
S	3437	3547			3547	1583		3321					
Sec.													

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	310	3437	#	0.09	0.11	368	0.84
Prot								
Perm								
Thru	T	538	3547		0.15	0.50	1783	0.30
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1097	3547	#	0.31	0.34	1204	0.91
Right	R	435	1583		0.27	0.34	538	0.81
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	1165	3321	#	0.35	0.37	1230	0.95
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.75
Total lost time per cycle, L = 13.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.92

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.84	0.11	32.8	1.000	368	0.38	16.1	0.0	48.9	D		
T	0.30	0.50	10.9	1.000	1783	0.11	0.1	0.0	11.0	B	24.8	C
Westbound												
T	0.91	0.34	23.6	1.000	1204	0.43	10.5	0.0	34.1	C	33.3	C
R	0.81	0.34	22.5	1.000	538	0.35	9.0	0.0	31.5	C		
Northbound												
LTR	0.95	0.37	22.8	1.000	1230	0.46	14.8	0.0	37.7	D	37.7	D
Southbound												

Intersection delay = 32.7 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 74.8 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 74.8 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.328	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

			EBLT	WBLT	NBLT	SBLT
Cycle length, C	74.8	sec				
Adj. LT vol from Vol Adjustment Worksheet, v						
v/c ratio from Capacity Worksheet, X						
Protected phase effective green interval, g (s)						
Opposing queue effective green interval, gq						
Unopposed green interval, gu						
Red time r=(C-g-gq-gu)						
Arrival rate, qa=v/(3600(max[X,1.0]))						
Protected ph. departure rate, Sp=s/3600						
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)						
XPerm						
XProt						
Case						
Queue at beginning of green arrow, Qa						
Queue at beginning of unsaturated green, Qu						
Residual queue, Qr						
Uniform Delay, d1						

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

L	0.0	0.00	33.4	32.8	0.00	0.0	0.0	48.9
T	0.0	0.00	18.6	10.9	0.00	0.0	0.0	11.0
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	24.7	23.6	0.00	0.0	0.0	34.1
R	0.0	0.00	24.7	22.5	0.00	0.0	0.0	31.5
Northbound								
	0.0						0.0	
LTR	0.0	0.00	23.6	22.8	0.00	0.0	0.0	37.7
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 32.7 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	T		T	R		LTR					
Init Queue	0.0	0.0		0.0	0.0		0.0					
Flow Rate	159	282		576	435		611					
So	1900	1900		1900	1900		1900					
No.Lanes	2	2	0	0 2	1		0 2	0		0 0	0	
SL	1770	1862		1862	1583		1744					
LnCapacity	189	936		632	538		646					
Flow Ratio	0.1	0.2		0.3	0.3		0.4					
v/c Ratio	0.84	0.30		0.91	0.81		0.95					
Grn Ratio	0.11	0.50		0.34	0.34		0.37					
I Factor		1.000		1.000			1.000					
AT or PVG	3	3		3	3		3					
Pltn Ratio	1.00	1.00		1.00	1.00		1.00					
PF2	1.00	1.00		1.00	1.00		1.00					
Q1	3.2	3.4		11.4	8.2		12.3					
kB	0.2	0.6		0.5	0.4		0.5					
Q2	1.0	0.3		3.3	1.6		4.2					
Q Average	4.2	3.7		14.7	9.8		16.5					
Q Spacing	25.0	25.0		25.0	25.0		25.0					
Q Storage	0	0		0	0		0					
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2		1.2	1.2		1.2					
BOQ	5.0	4.4		17.2	11.6		19.3					
QSRatio												
85th Percentile Output:												
fB%	1.6	1.6		1.5	1.5		1.5					
BOQ	6.6	5.8		21.9	14.9		24.3					
QSRatio												
90th Percentile Output:												
fB%	1.7	1.7		1.6	1.6		1.6					
BOQ	7.2	6.4		23.4	16.2		26.0					
QSRatio												
95th Percentile Output:												
fB%	2.0	2.0		1.8	1.8		1.7					
BOQ	8.3	7.3		26.0	18.2		28.7					
QSRatio												
98th Percentile Output:												
fB%	2.4	2.5		2.0	2.2		2.0					
BOQ	10.2	9.0		29.8	21.3		32.7					
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 SB Ramps

Inter.: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
LGConfig		T	R	L	T						LTR	
Volume		1287	224	69	519					503	117	251
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0								0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	6.0	14.7	15.9	0.0	25.1	0.0		
Yellow	3.0	4.0	4.0		3.3			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1578	3547	0.86	0.44	24.9	C	23.4	C
R	704	1583	0.34	0.44	14.8	B		
Westbound								
L	133	1770	0.55	0.08	40.5	D		
T	2022	3547	0.27	0.57	8.8	A	12.5	B
Northbound								
Southbound								
LTR	1035	3298	0.89	0.31	35.4	D	35.4	D

Intersection Delay = 24.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Baker at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 SB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1287	224	69	519					503	117	251
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		339	59	18	137					132	31	66
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900	1900	1900						1900	
ParkExist												
NumPark												
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
LGConfig		T	R	L	T						LTR	
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0
Adj Flow		1355	236	73	546						916	
%InSharedLn												
Prop LTs		0.000			0.000						0.578	
Prop RTs		0.000	1.000		0.000						0.288	
Peds Bikes		0						0			0	
Buses		0	0	0	0						0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0	0.0	0.0						0.0	
Arriv. Type		3	3	3	3						3	
Unit Ext.		3.0	3.0	3.0	3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0	2.0	2.0						2.0	
Ext of g		2.0	2.0	2.0	2.0						2.0	
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	6.0	14.7	15.9	0.0	25.1	0.0		
Yellow	3.0	4.0	4.0		3.3			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1287	224	69	519					503	117	251
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		1355	236	73	546					529	123	264
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
Lane group		T	R	L	T						LTR	
Adj flow		1355	236	73	546						916	
Prop LTs		0.000			0.000						0.578	
Prop RTs		0.000	1.000		0.000						0.288	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound				Southbound	
LG	T	R	L	T					LTR	
So	1900	1900	1900	1900					1900	
Lanes	0 2	1	1	2	0	0	0	0	2	0
fW	1.000	1.000	1.000	1.000					1.000	
fHV	0.980	0.980	0.980	0.980					0.980	
fG	1.000	1.000	1.000	1.000					1.000	
fP	1.000	1.000	1.000	1.000					1.000	
fBB	1.000	1.000	1.000	1.000					1.000	
fA	1.000	1.000	1.000	1.000					1.000	
fLU	0.952	1.000	1.000	0.952					0.952	
fRT	1.000	0.850		1.000					0.957	
fLT	1.000		0.950	1.000					0.972	
Sec.										
fLpb	1.000		1.000	1.000					1.000	
fRpb	1.000	1.000		1.000					1.000	
S	3547	1583	1770	3547					3298	
Sec.										

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1355	3547	#	0.38	0.44	1578	0.86
Right	R	236	1583		0.15	0.44	704	0.34
Westbound								
Prot								
Perm								
Left	L	73	1770	#	0.04	0.08	133	0.55
Prot								
Perm								
Thru	T	546	3547		0.15	0.57	2022	0.27
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	916	3298	#	0.28	0.31	1035	0.89
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.70
Total lost time per cycle, L = 13.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.84

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.86	0.44	19.9	1.000	1578	0.39	5.0	0.0	24.9	C	23.4	C
R	0.34	0.44	14.5	1.000	704	0.11	0.3	0.0	14.8	B		
Westbound												
L	0.55	0.08	35.7	1.000	133	0.15	4.8	0.0	40.5	D		
T	0.27	0.57	8.7	1.000	2022	0.11	0.1	0.0	8.8	A	12.5	B
Northbound												
Southbound												

LTR 0.89 0.31 26.1 1.000 1035 0.41 9.3 0.0 35.4 D 35.4 D

Intersection delay = 24.8 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.578
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	22.2	19.9	0.00	0.0	0.0	24.9
R	0.0	0.00	22.2	14.5	0.00	0.0	0.0	14.8
Westbound								
L	0.0	0.00	37.0	35.7	0.00	0.0	0.0	40.5
T	0.0	0.00	17.2	8.7	0.00	0.0	0.0	8.8
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LTR	0.0	0.00	27.5	26.1	0.00	0.0	0.0	35.4
	0.0						0.0	

Intersection Delay 24.8 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound			Southbound		
LaneGroup	T	R	L	T					LTR		
Init Queue	0.0	0.0	0.0	0.0					0.0		
Flow Rate	711	236	73	286					481		
So	1900	1900	1900	1900					1900		
No.Lanes	0 2	1	1	2	0	0	0	0	2	0	
SL	1862	1583	1770	1862					1732		
LnCapacity	828	704	133	1061					543		
Flow Ratio	0.4	0.1	0.0	0.2					0.3		
v/c Ratio	0.86	0.34	0.55	0.27					0.89		
Grn Ratio	0.44	0.44	0.08	0.57					0.31		
I Factor	1.000			1.000					1.000		
AT or PVG	3	3	3	3					3		
Pltn Ratio	1.00	1.00	1.00	1.00					1.00		
PF2	1.00	1.00	1.00	1.00					1.00		
Q1	14.2	3.4	1.6	3.2					10.2		
kB	0.6	0.5	0.2	0.7					0.4		
Q2	2.9	0.3	0.2	0.2					2.6		
Q Average	17.1	3.7	1.8	3.5					12.8		
Q Spacing	25.0	25.0	25.0	25.0					25.0		
Q Storage	0	0	0	0					0		
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2	1.2	1.2					1.2		
BOQ	19.9	4.4	2.1	4.1					15.0		
QSRatio											
85th Percentile Output:											
fB%	1.5	1.6	1.6	1.6					1.5		
BOQ	25.1	5.8	2.8	5.4					19.1		
QSRatio											
90th Percentile Output:											
fB%	1.6	1.7	1.8	1.7					1.6		
BOQ	26.9	6.4	3.2	6.0					20.5		
QSRatio											
95th Percentile Output:											
fB%	1.7	2.0	2.0	2.0					1.8		
BOQ	29.6	7.3	3.7	6.9					22.9		
QSRatio											
98th Percentile Output:											
fB%	2.0	2.5	2.6	2.5					2.1		
BOQ	33.7	9.0	4.6	8.6					26.5		
QSRatio											

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 SB Ramps

Inter.: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
LGConfig		T	R	L	T						LTR	
Volume		639	432	243	1077					221	305	463
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	13.7	14.3	5.4	0.0	28.3	0.0		
Yellow	3.0	4.0	4.0		3.3			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1095	3547	0.61	0.31	24.6	C	35.4	D
R	489	1583	0.93	0.31	51.4	D		
Westbound								
L	303	1770	0.84	0.17	51.4	D		
T	1880	3547	0.60	0.53	13.5	B	20.5	C
Northbound								
Southbound								
LTR	1154	3261	0.90	0.35	34.5	C	34.5	C

Intersection Delay = 29.3 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Baker at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 SB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		639	432	243	1077					221	305	463
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		168	114	64	283					58	80	122
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900	1900	1900						1900	
ParkExist												
NumPark												
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
LGConfig		T	R	L	T						LTR	
Lane Width		12.0	12.0	12.0	12.0						12.0	
RTOR Vol			0									0
Adj Flow		673	455	256	1134						1041	
%InSharedLn												
Prop LTs		0.000			0.000						0.224	
Prop RTs		0.000	1.000		0.000						0.468	
Peds Bikes		0						0			0	
Buses		0	0	0	0						0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0	0.0	0.0						0.0	
Arriv. Type		3	3	3	3						3	
Unit Ext.		3.0	3.0	3.0	3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0	2.0	2.0						2.0	
Ext of g		2.0	2.0	2.0	2.0						2.0	
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	13.7	14.3	5.4	0.0		28.3	0.0	
Yellow	3.0	4.0	4.0			3.3		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		639	432	243	1077					221	305	463
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		673	455	256	1134					233	321	487
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	0
Lane group		T	R	L	T						LTR	
Adj flow		673	455	256	1134						1041	
Prop LTs		0.000			0.000						0.224	
Prop RTs		0.000	1.000		0.000						0.468	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound				Southbound	
LG	T	R	L	T					LTR	
So	1900	1900	1900	1900					1900	
Lanes	0 2	1	1	2	0	0	0	0	2	0
fW	1.000	1.000	1.000	1.000					1.000	
fHV	0.980	0.980	0.980	0.980					0.980	
fG	1.000	1.000	1.000	1.000					1.000	
fP	1.000	1.000	1.000	1.000					1.000	
fBB	1.000	1.000	1.000	1.000					1.000	
fA	1.000	1.000	1.000	1.000					1.000	
fLU	0.952	1.000	1.000	0.952					0.952	
fRT	1.000	0.850		1.000					0.930	
fLT	1.000		0.950	1.000					0.989	
Sec.										
fLpb	1.000		1.000	1.000					1.000	
fRpb	1.000	1.000		1.000					1.000	
S	3547	1583	1770	3547					3261	
Sec.										

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	673	3547		0.19	0.31	1095	0.61
Right	R	455	1583	#	0.29	0.31	489	0.93
Westbound								
Prot								
Perm								
Left	L	256	1770	#	0.14	0.17	303	0.84
Prot								
Perm								
Thru	T	1134	3547		0.32	0.53	1880	0.60
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	1041	3261	#	0.32	0.35	1154	0.90
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.75
Total lost time per cycle, L = 13.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.90

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.61	0.31	23.6	1.000	1095	0.20	1.0	0.0	24.6	C	35.4	D
R	0.93	0.31	26.8	1.000	489	0.45	24.6	0.0	51.4	D		
Westbound												
L	0.84	0.17	32.1	1.000	303	0.38	19.2	0.0	51.4	D		
T	0.60	0.53	13.0	1.000	1880	0.19	0.6	0.0	13.5	B	20.5	C
Northbound												
Southbound												

LTR 0.90 0.35 24.5 1.000 1154 0.42 9.9 0.0 34.5 C 34.5 C

Intersection delay = 29.3 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.224
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	27.7	23.6	0.00	0.0	0.0	24.6
R	0.0	0.00	27.7	26.8	0.00	0.0	0.0	51.4
Westbound								
L	0.0	0.00	33.2	32.1	0.00	0.0	0.0	51.4
T	0.0	0.00	18.8	13.0	0.00	0.0	0.0	13.5
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LTR	0.0	0.00	25.9	24.5	0.00	0.0	0.0	34.5
	0.0						0.0	

Intersection Delay 29.3 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	T	R	L	T			LTR	
Init Queue	0.0	0.0	0.0	0.0			0.0	
Flow Rate	353	455	256	595			546	
So	1900	1900	1900	1900			1900	
No.Lanes	2	1	1	2	0	0 0 0	2	0
SL	1862	1583	1770	1862			1712	
LnCapacity	575	489	303	987			606	
Flow Ratio	0.2	0.3	0.1	0.3			0.3	
v/c Ratio	0.61	0.93	0.84	0.60			0.90	
Grn Ratio	0.31	0.31	0.17	0.53			0.35	
I Factor	1.000			1.000			1.000	
AT or PVG	3	3	3	3			3	
Pltn Ratio	1.00	1.00	1.00	1.00			1.00	
PF2	1.00	1.00	1.00	1.00			1.00	
Q1	6.7	9.8	5.5	9.1			11.5	
kB	0.5	0.4	0.3	0.6			0.5	
Q2	0.7	3.2	1.4	0.9			3.1	
Q Average	7.4	13.0	6.9	10.1			14.6	
Q Spacing	25.0	25.0	25.0	25.0			25.0	
Q Storage	0	0	0	0			0	
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2	1.2	1.2			1.2	
BOQ	8.8	15.2	8.2	11.9			17.1	
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5	1.5	1.5			1.5	
BOQ	11.4	19.4	10.6	15.3			21.6	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.6	1.7	1.6			1.6	
BOQ	12.4	20.9	11.6	16.6			23.2	
QSRatio								
95th Percentile Output:								
fB%	1.9	1.8	1.9	1.8			1.8	
BOQ	14.1	23.3	13.2	18.6			25.8	
QSRatio								
98th Percentile Output:								
fB%	2.3	2.1	2.3	2.2			2.0	
BOQ	16.8	26.9	15.8	21.8			29.5	
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 NB Ramps

Inter.: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	0	2	1	0	0	0
LGConfig	L	T			TR			LT	R			

Volume	323	1113		179	232	91	645	137			
Lane Width	12.0	12.0		12.0		12.0	12.0				
RTOR Vol				0			0				

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4		5	6	7	8
EB	Left	A				NB Left	A			
	Thru	A	A	A		Thru	A			
	Right					Right	A			
	Peds					Peds				
WB	Left					SB Left				
	Thru		A	A		Thru				
	Right		A	A		Right				
	Peds					Peds				
NB	Right					EB Right				
SB	Right					WB Right				
Green		16.0	5.6	6.3	0.0		17.9	0.0		
Yellow		3.6	4.0	4.0			3.6			
All Red		1.0	1.0	1.0			1.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Flow (s)	Sat Rate	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound									
L	436	1770		0.78	0.25	31.7	C		
T	2046	3547		0.57	0.58	9.1	A	14.2	B
Westbound									
TR	844	3246		0.51	0.26	21.1	C	21.1	C
Northbound									
LT	971	3525		0.80	0.28	26.6	C	25.5	C
R	436	1583		0.33	0.28	19.2	B		
Southbound									

Intersection Delay = 18.8 (sec/veh) Intersection LOS = B

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Paularino at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project
E/W St:	SR-55 NB Ramps
N/S St:	Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	323	1113		179	232		91	645	137			
% Heavy Veh	2	2		2	2		2	2	2			
PHF	0.95	0.95		0.95	0.95		0.95	0.95	0.95			
PK 15 Vol	85	293		47	61		24	170	36			
Hi Ln Vol												
% Grade		0		0				0				
Ideal Sat	1900	1900		1900				1900	1900			
ParkExist												

NumPark					
No. Lanes	1 2 0	0 2 0	0 2 1	0 0 0	
LGConfig	L T	TR	LT R		
Lane Width	12.0 12.0	12.0	12.0 12.0		
RTOR Vol		0	0		
Adj Flow	340 1172	432	775 144		
%InSharedLn					
Prop LTs	0.000	0.000	0.124		
Prop RTs	0.000	0.565	0.000 1.000		
Peds Bikes		0	0	0	
Buses	0 0	0	0 0		
%InProtPhase					

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0		0.0			0.0	0.0				
Arriv. Type	3	3		3			3	3				
Unit Ext.	3.0	3.0		3.0			3.0	3.0				
I Factor		1.000		1.000			1.000					
Lost Time	2.0	2.0		2.0			2.0	2.0				
Ext of g	2.0	2.0		2.0			2.0	2.0				
Ped Min g				3.2			3.2			3.2		

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	16.0	5.6	6.3	0.0		17.9	0.0	
Yellow	3.6	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	323	1113		179	232		91	645	137			
PHF	0.95	0.95		0.95	0.95		0.95	0.95	0.95			
Adj flow	340	1172		188	244		96	679	144			
No. Lanes	1	2	0	0	2	0	0	2	1	0	0	0
Lane group	L	T		TR			LT	R				
Adj flow	340	1172		432			775	144				
Prop LTs		0.000		0.000			0.124					
Prop RTs	0.000			0.565			0.000	1.000				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound				Westbound				Northbound			Southbound		
LG	L	T			TR				LT	R				
So	1900	1900			1900				1900	1900				
Lanes	1	2	0	0	2	0	0		2	1	0	0	0	
fW	1.000	1.000			1.000				1.000	1.000				
fHV	0.980	0.980			0.980				0.980	0.980				
fG	1.000	1.000			1.000				1.000	1.000				
fP	1.000	1.000			1.000				1.000	1.000				
fBB	1.000	1.000			1.000				1.000	1.000				
fA	1.000	1.000			1.000				1.000	1.000				
fLU	1.000	0.952			0.952				0.952	1.000				
fRT		1.000			0.915				1.000	0.850				
fLT	0.950	1.000			1.000				0.994					

Sec.

fLpb 1.000 1.000 1.000 1.000
fRpb 1.000 1.000 1.000 1.000
S 1770 3547 3246 3525 1583
Sec.

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	340	1770		0.19	0.25	436	0.78
Prot								
Perm								
Thru	T	1172	3547	#	0.33	0.58	2046	0.57
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	432	3246		0.13	0.26	844	0.51
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	775	3525	#	0.22	0.28	971	0.80
Right	R	144	1583		0.09	0.28	436	0.33
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.55
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.65

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.78	0.25	22.9	1.000	436	0.33	8.8	0.0	31.7	C		
T	0.57	0.58	8.7	1.000	2046	0.17	0.4	0.0	9.1	A	14.2	B
Westbound												
TR	0.51	0.26	20.5	1.000	844	0.12	0.5	0.0	21.1	C	21.1	C
Northbound												
LT	0.80	0.28	21.9	1.000	971	0.34	4.8	0.0	26.6	C	25.5	C
R	0.33	0.28	18.8	1.000	436	0.11	0.4	0.0	19.2	B		
Southbound												

Intersection delay = 18.8 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET

for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				

Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 0.952 0.952 0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.124	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

			EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0	sec				
Adj. LT vol from Vol Adjustment Worksheet, v						
v/c ratio from Capacity Worksheet, X						
Protected phase effective green interval, g (s)						
Opposing queue effective green interval, gq						
Unopposed green interval, gu						
Red time r=(C-g-gq-gu)						
Arrival rate, qa=v/(3600(max[X,1.0]))						
Protected ph. departure rate, Sp=s/3600						
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)						
XPerm						
XProt						
Case						
Queue at beginning of green arrow, Qa						
Queue at beginning of unsaturated green, Qu						
Residual queue, Qr						
Uniform Delay, d1						

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	24.5	22.9	0.00	0.0	0.0	31.7
T	0.0	0.00	13.8	8.7	0.00	0.0	0.0	9.1
	0.0						0.0	
Westbound								
	0.0						0.0	
TR	0.0	0.00	24.0	20.5	0.00	0.0	0.0	21.1
	0.0						0.0	
Northbound								
	0.0						0.0	
LT	0.0	0.00	23.6	21.9	0.00	0.0	0.0	26.6
R	0.0	0.00	23.6	18.8	0.00	0.0	0.0	19.2
Southbound								
	0.0						0.0	

0.0			0.0
0.0			0.0

Intersection Delay 18.8 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound	Northbound		Southbound
LaneGroup	L	T	TR	LT	R	
Init Queue	0.0	0.0	0.0	0.0	0.0	
Flow Rate	340	615	226	407	144	
So	1900	1900	1900	1900	1900	
No.Lanes	1	2 0	0 2 0	2	1	0 0 0
SL	1770	1862	1704	1851	1583	
LnCapacity	436	1074	443	509	436	
Flow Ratio	0.2	0.3	0.1	0.2	0.1	
v/c Ratio	0.78	0.57	0.51	0.80	0.33	
Grn Ratio	0.25	0.58	0.26	0.28	0.28	
I Factor		1.000	1.000	1.000		
AT or PVG	3	3	3	3	3	
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	
PF2	1.00	1.00	1.00	1.00	1.00	
Q1	5.7	7.0	3.5	6.8	2.1	
kB	0.3	0.6	0.3	0.4	0.3	
Q2	1.1	0.8	0.4	1.4	0.2	
Q Average	6.8	7.8	3.8	8.2	2.2	
Q Spacing	25.0	25.0	25.0	25.0	25.0	
Q Storage	0	0	0	0	0	
Q S Ratio						
70th Percentile Output:						
fB%	1.2	1.2	1.2	1.2	1.2	
BOQ	8.1	9.2	4.6	9.7	2.7	
QSRatio						
85th Percentile Output:						
fB%	1.5	1.5	1.6	1.5	1.6	
BOQ	10.5	11.9	6.0	12.5	3.5	
QSRatio						
90th Percentile Output:						
fB%	1.7	1.7	1.7	1.7	1.8	
BOQ	11.5	13.0	6.6	13.6	3.9	
QSRatio						
95th Percentile Output:						
fB%	1.9	1.9	2.0	1.9	2.0	
BOQ	13.1	14.7	7.6	15.4	4.6	
QSRatio						
98th Percentile Output:						
fB%	2.3	2.2	2.4	2.2	2.5	
BOQ	15.7	17.5	9.4	18.3	5.7	
QSRatio						

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 NB Ramps

Inter.: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	0	0	2	1	0	0	0
LGConfig	L	T			TR			LT	R			
Volume	225	396			767	502	123	693	84			
Lane Width	12.0	12.0			12.0			12.0	12.0			
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	11.4	9.6	24.3	0.0		25.5	0.0		
Yellow	3.6	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	224	1770	1.06	0.13	115.6	F		
T	2164	3547	0.19	0.61	7.8	A	46.9	D
Westbound								
TR	1442	3336	0.93	0.43	34.7	C	34.7	C
Northbound								
LT	997	3520	0.86	0.28	38.3	D	37.1	D
R	449	1583	0.20	0.28	24.7	C		
Southbound								

Intersection Delay = 38.2 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Paularino at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 NB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	225	396			767	502	123	693	84			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	59	104			202	132	32	182	22			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900			1900	1900			
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	0	0	2	1	0	0	0
LGConfig	L	T			TR			LT	R			
Lane Width	12.0	12.0			12.0			12.0	12.0			
RTOR Vol						0			0			
Adj Flow	237	417			1335			858	88			
%InSharedLn												
Prop LTs		0.000			0.000			0.150				
Prop RTs		0.000			0.396			0.000	1.000			
Peds Bikes					0			0			0	
Buses	0	0			0			0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0			0.0	0.0			
Arriv. Type	3	3			3			3	3			
Unit Ext.	3.0	3.0			3.0			3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0			2.0	2.0			
Ext of g	2.0	2.0			2.0			2.0	2.0			
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	11.4	9.6	24.3	0.0		25.5	0.0	
Yellow	3.6	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	225	396			767	502	123	693	84			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	237	417			807	528	129	729	88			
No. Lanes	1	2	0	0	2	0	0	2	1	0	0	0
Lane group	L	T			TR			LT	R			
Adj flow	237	417			1335			858	88			
Prop LTs		0.000			0.000			0.150				
Prop RTs		0.000			0.396			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound			Northbound			Southbound		
LG	L	T			TR			LT	R				
So	1900	1900			1900			1900	1900				
Lanes	1	2	0	0	2	0	0	2	1	0	0	0	
fW	1.000	1.000			1.000			1.000	1.000				
fHV	0.980	0.980			0.980			0.980	0.980				
fG	1.000	1.000			1.000			1.000	1.000				
fP	1.000	1.000			1.000			1.000	1.000				
fBB	1.000	1.000			1.000			1.000	1.000				
fA	1.000	1.000			1.000			1.000	1.000				
fLU	1.000	0.952			0.952			0.952	1.000				
fRT		1.000			0.941			1.000	0.850				
fLT	0.950	1.000			1.000			0.993					
Sec.													
fLpb	1.000	1.000			1.000			1.000					
fRpb		1.000			1.000			1.000	1.000				
S	1770	3547			3336			3520	1583				
Sec.													

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	237	1770	#	0.13	0.13	224	1.06
Prot								
Perm								
Thru	T	417	3547		0.12	0.61	2164	0.19
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1335	3336	#	0.40	0.43	1442	0.93
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	858	3520	#	0.24	0.28	997	0.86
Right	R	88	1583		0.06	0.28	449	0.20
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.78
Total lost time per cycle, L = 14.20 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.92

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.06	0.13	39.3	1.000	224	0.50	76.3	0.0	115.6	F		
T	0.19	0.61	7.8	1.000	2164	0.11	0.0	0.0	7.8	A	46.9	D
Westbound												
TR	0.93	0.43	24.2	1.000	1442	0.44	10.5	0.0	34.7	C	34.7	C
Northbound												
LT	0.86	0.28	30.6	1.000	997	0.39	7.8	0.0	38.3	D	37.1	D
R	0.20	0.28	24.5	1.000	449	0.11	0.2	0.0	24.7	C		
Southbound												

Intersection delay = 38.2 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.150	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	90.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	39.3	39.3	0.00	3.3	0.0	115.6

T	0.0	0.00	17.5	7.8	0.00	0.0	0.0	7.8
	0.0						0.0	
Westbound								
	0.0						0.0	
TR	0.0	0.00	25.5	24.2	0.00	0.0	0.0	34.7
	0.0						0.0	
Northbound								
	0.0						0.0	
LT	0.0	0.00	32.3	30.6	0.00	0.0	0.0	38.3
R	0.0	0.00	32.3	24.5	0.00	0.0	0.0	24.7
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 38.2 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	T		TR			LT	R				
Init Queue	0.0	0.0		0.0			0.0	0.0				
Flow Rate	237	219		701			450	88				
So	1900	1900		1900			1900	1900				
No.Lanes	1	2	0	0	2	0	2	1		0	0	0
SL	1770	1862		1752			1848	1583				
LnCapacity	224	1136		757			523	449				
Flow Ratio	0.1	0.1		0.4			0.2	0.1				
v/c Ratio	1.06	0.19		0.93			0.86	0.20				
Grn Ratio	0.13	0.61		0.43			0.28	0.28				
I Factor		1.000		1.000			1.000					
AT or PVG	3	3		3			3	3				
Pltn Ratio	1.00	1.00		1.00			1.00	1.00				
PF2	1.00	1.00		1.00			1.00	1.00				
Q1	5.9	2.4		16.6			10.7	1.7				
kB	0.3	0.7		0.6			0.5	0.4				
Q2	3.8	0.2		4.5			2.3	0.1				
Q Average	9.7	2.6		21.1			13.0	1.8				
Q Spacing	25.0	25.0		25.0			25.0	25.0				
Q Storage	0	0		0			0	0				
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2		1.2			1.2	1.2				
BOQ	11.5	3.1		24.4			15.2	2.1				
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6		1.4			1.5	1.6				
BOQ	14.8	4.1		30.5			19.4	2.8				
QSRatio												
90th Percentile Output:												
fB%	1.6	1.8		1.5			1.6	1.8				
BOQ	16.0	4.5		32.4			20.9	3.1				
QSRatio												
95th Percentile Output:												
fB%	1.8	2.0		1.7			1.8	2.0				
BOQ	18.0	5.2		35.5			23.2	3.6				
QSRatio												
98th Percentile Output:												
fB%	2.2	2.5		1.9			2.1	2.6				
BOQ	21.2	6.5		40.0			26.8	4.6				
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 SB Ramps

Inter.: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
LGConfig		TR		L	T						LTR	
Volume		867	136	73	198					573	721	202
Lane Width		12.0		12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	4.8	6.8	20.8	0.0		48.8	0.0	
Yellow	3.2	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	1133	3475	0.93	0.33	46.1	D	46.1	D
Westbound								
L	85	1770	0.91	0.05	114.6	F		
T	1476	3547	0.14	0.42	18.2	B	44.2	D
Northbound								
Southbound								
LTR	1664	3409	0.95	0.49	36.1	D	36.1	D

Intersection Delay = 40.5 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Paularino at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 SB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		867	136	73	198					573	721	202
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		228	36	19	52					151	190	53
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900		1900	1900						1900	
ParkExist												
NumPark												
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
LGConfig		TR		L	T						LTR	
Lane Width		12.0		12.0	12.0						12.0	
RTOR Vol			0									0
Adj Flow		1056		77	208						1575	
%InSharedLn												
Prop LTs		0.000			0.000						0.383	
Prop RTs		0.135			0.000						0.135	
Peds Bikes		0						0			0	
Buses		0		0	0						0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0						0.0	
Arriv. Type		3		3	3						3	
Unit Ext.		3.0		3.0	3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0		2.0	2.0						2.0	
Ext of g		2.0		2.0	2.0						2.0	
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
WB Left	A				SB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	4.8	6.8	20.8	0.0		48.8	0.0		
Yellow	3.2	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		867	136	73	198					573	721	202
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		913	143	77	208					603	759	213
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
Lane group		TR		L	T						LTR	
Adj flow		1056		77	208						1575	
Prop LTs		0.000			0.000						0.383	
Prop RTs		0.135			0.000						0.135	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound			Northbound			Southbound	
LG	TR		L	T					LTR	
So	1900		1900	1900					1900	
Lanes	0 2	0	1	2	0	0	0	0	2	0
fW	1.000		1.000	1.000					1.000	
fHV	0.980		0.980	0.980					0.980	
fG	1.000		1.000	1.000					1.000	
fP	1.000		1.000	1.000					1.000	
fBB	1.000		1.000	1.000					1.000	
fA	1.000		1.000	1.000					1.000	
fLU	0.952		1.000	0.952					0.952	
fRT	0.980			1.000					0.980	
fLT	1.000		0.950	1.000					0.981	
Sec.										
fLpb	1.000		1.000	1.000					1.000	
fRpb	1.000			1.000					1.000	
S	3475		1770	3547					3409	
Sec.										

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1056	3475	#	0.30	0.33	1133	0.93
Right								
Westbound								
Prot								
Perm								
Left	L	77	1770	#	0.04	0.05	85	0.91
Prot								
Perm								
Thru	T	208	3547		0.06	0.42	1476	0.14
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	1575	3409	#	0.46	0.49	1664	0.95
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.81
Total lost time per cycle, L = 13.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.94

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	0.93	0.33	32.6	1.000	1133	0.45	13.5	0.0	46.1	D	46.1	D
Westbound												
L	0.91	0.05	47.4	1.000	85	0.43	67.2	0.0	114.6	F		
T	0.14	0.42	18.1	1.000	1476	0.11	0.0	0.0	18.2	B	44.2	D
Northbound												
Southbound												

LTR	0.95	0.49	24.4	1.000	1664	0.46	11.8	0.0	36.1	D	36.1	D

Intersection delay = 40.5 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.383
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	100.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	33.7	32.6	0.00	0.0	0.0	46.1
	0.0						0.0	
Westbound								
L	0.0	0.00	47.6	47.4	0.00	0.0	0.0	114.6
T	0.0	0.00	29.2	18.1	0.00	0.0	0.0	18.2
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LTR	0.0	0.00	25.6	24.4	0.00	0.0	0.0	36.1
	0.0						0.0	

Intersection Delay 40.5 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup	TR	L T		LTR
Init Queue	0.0	0.0 0.0		0.0
Flow Rate	554	77 109		827
So	1900	1900 1900		1900
No.Lanes	0 2 0	1 2 0	0 0 0	0 2 0
SL	1825	1770 1862		1790
LnCapacity	595	85 775		873
Flow Ratio	0.3	0.0 0.1		0.5
v/c Ratio	0.93	0.91 0.14		0.95
Grn Ratio	0.33	0.05 0.42		0.49
I Factor	1.000	1.000		1.000
AT or PVG	3	3 3		3
Pltn Ratio	1.00	1.00 1.00		1.00
PF2	1.00	1.00 1.00		1.00
Q1	14.9	2.1 1.9		21.9
kB	0.5	0.2 0.6		0.7
Q2	4.1	0.9 0.1		6.0
Q Average	19.0	3.0 2.0		27.8
Q Spacing	25.0	25.0 25.0		25.0
Q Storage	0	0 0		0
Q S Ratio				
70th Percentile Output:				
fB%	1.2	1.2 1.2		1.1
BOQ	22.0	3.6 2.4		32.0
QSRatio				
85th Percentile Output:				
fB%	1.5	1.6 1.6		1.4
BOQ	27.7	4.7 3.1		39.5
QSRatio				
90th Percentile Output:				
fB%	1.6	1.7 1.8		1.5
BOQ	29.5	5.2 3.5		41.8
QSRatio				
95th Percentile Output:				
fB%	1.7	2.0 2.0		1.6
BOQ	32.4	6.0 4.0		45.3
QSRatio				
98th Percentile Output:				
fB%	1.9	2.5 2.6		1.8
BOQ	36.6	7.5 5.1		50.6
QSRatio				

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 SB Ramps

Inter.: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
LGConfig		TR		L	T						LTR	
Volume		464	118	214	685					118	612	289
Lane Width		12.0		12.0	12.0						12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	10.5	5.0	5.0	0.0	25.4	0.0		
Yellow	3.2	4.0	4.0		3.6			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 64.7 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	797	3439	0.77	0.23	27.8	C	27.8	C
Westbound								
L	287	1770	0.78	0.16	39.3	D		
T	1628	3547	0.44	0.46	12.1	B	18.5	B
Northbound								
Southbound								
LTR	1325	3376	0.81	0.39	21.4	C	21.4	C

Intersection Delay = 21.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Paularino at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 SB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		464	118	214	685					118	612	289
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		122	31	56	180					31	161	76
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900		1900	1900						1900	
ParkExist												
NumPark												
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
LGConfig		TR		L	T						LTR	
Lane Width		12.0		12.0	12.0						12.0	
RTOR Vol			0									0
Adj Flow		612		225	721						1072	
%InSharedLn												
Prop LTs		0.000			0.000						0.116	
Prop RTs		0.203			0.000						0.284	
Peds Bikes		0						0			0	
Buses		0		0	0						0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0						0.0	
Arriv. Type		3		3	3						3	
Unit Ext.		3.0		3.0	3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0		2.0	2.0						2.0	
Ext of g		2.0		2.0	2.0						2.0	
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	10.5	5.0	5.0	0.0		25.4	0.0	
Yellow	3.2	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 64.7 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		464	118	214	685					118	612	289
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		488	124	225	721					124	644	304
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	0
Lane group		TR		L	T						LTR	
Adj flow		612		225	721						1072	
Prop LTs		0.000			0.000						0.116	
Prop RTs		0.203			0.000						0.284	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound				Southbound	
LG	TR		L	T					LTR	
So	1900		1900	1900					1900	
Lanes	0 2	0	1	2	0 0	0	0	0	2	0
fW	1.000		1.000	1.000					1.000	
fHV	0.980		0.980	0.980					0.980	
fG	1.000		1.000	1.000					1.000	
fP	1.000		1.000	1.000					1.000	
fBB	1.000		1.000	1.000					1.000	
fA	1.000		1.000	1.000					1.000	
fLU	0.952		1.000	0.952					0.952	
fRT	0.970			1.000					0.957	
fLT	1.000		0.950	1.000					0.994	
Sec.										
fLpb	1.000		1.000	1.000					1.000	
fRpb	1.000			1.000					1.000	
S	3439		1770	3547					3376	
Sec.										

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	612	3439	#	0.18	0.23	797	0.77
Right								
Westbound								
Prot								
Perm								
Left	L	225	1770	#	0.13	0.16	287	0.78
Prot								
Perm								
Thru	T	721	3547		0.20	0.46	1628	0.44
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LTR	1072	3376	#	0.32	0.39	1325	0.81
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.62
Total lost time per cycle, L = 13.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.79

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	0.77	0.23	23.2	1.000	797	0.32	4.6	0.0	27.8	C	27.8	C
Westbound												
L	0.78	0.16	26.0	1.000	287	0.33	13.3	0.0	39.3	D		
T	0.44	0.46	11.9	1.000	1628	0.11	0.2	0.0	12.1	B	18.5	B
Northbound												
Southbound												

LTR 0.81 0.39 17.5 1.000 1325 0.35 3.9 0.0 21.4 C 21.4 C

Intersection delay = 21.8 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 64.7 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 64.7 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.116
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	64.7 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	24.8	23.2	0.00	0.0	0.0	27.8
	0.0						0.0	
Westbound								
L	0.0	0.00	27.1	26.0	0.00	0.0	0.0	39.3
T	0.0	0.00	17.5	11.9	0.00	0.0	0.0	12.1
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LTR	0.0	0.00	19.6	17.5	0.00	0.0	0.0	21.4
	0.0						0.0	

Intersection Delay 21.8 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup	TR	L T		LTR
Init Queue	0.0	0.0 0.0		0.0
Flow Rate	321	225 378		563
So	1900	1900 1900		1900
No.Lanes	0 2 0	1 2 0	0 0 0	0 2 0
SL	1806	1770 1862		1773
LnCapacity	418	287 855		695
Flow Ratio	0.2	0.1 0.2		0.3
v/c Ratio	0.77	0.78 0.44		0.81
Grn Ratio	0.23	0.16 0.46		0.39
I Factor	1.000	1.000		1.000
AT or PVG	3	3 3		3
Pltn Ratio	1.00	1.00 1.00		1.00
PF2	1.00	1.00 1.00		1.00
Q1	5.4	3.9 4.6		9.0
kB	0.3	0.3 0.5		0.5
Q2	1.0	0.9 0.4		1.8
Q Average	6.4	4.8 5.0		10.8
Q Spacing	25.0	25.0 25.0		25.0
Q Storage	0	0 0		0
Q S Ratio				
70th Percentile Output:				
fB%	1.2	1.2 1.2		1.2
BOQ	7.6	5.7 6.0		12.7
QSRatio				
85th Percentile Output:				
fB%	1.5	1.6 1.6		1.5
BOQ	9.9	7.4 7.8		16.3
QSRatio				
90th Percentile Output:				
fB%	1.7	1.7 1.7		1.6
BOQ	10.8	8.2 8.6		17.6
QSRatio				
95th Percentile Output:				
fB%	1.9	2.0 2.0		1.8
BOQ	12.3	9.3 9.8		19.7
QSRatio				
98th Percentile Output:				
fB%	2.3	2.4 2.4		2.1
BOQ	14.8	11.4 11.9		23.0
QSRatio				

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 NB Ramps

Inter.: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Volume		1358	620		772	350	1018		692			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left A			
Thru	A				Thru			
Right	A	A			Right A			
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right A			
SB Right					WB Right A			
Green	49.9	7.4	0.0		47.1	0.0		
Yellow	4.5	4.5			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1475	3547	0.97	0.42	50.8	D	34.9	C
R	1583	1583	0.41	1.00	0.2	A		
Westbound								
T	2655	5074	0.31	0.52	16.3	B	11.2	B
R	1583	1583	0.23	1.00	0.1	A		
Northbound								
L	1349	3437	0.79	0.39	35.6	D		
							21.3	C
R	1583	1583	0.46	1.00	0.2	A		
Southbound								

Intersection Delay = 24.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Macarthur at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1358	620		772	350	1018		692			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		357	163		203	92	268		182			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900		1900			
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			
Adj Flow		1429	653		813	368	1072		728			
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0	0	0		0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0		0.0			
Arriv. Type		3	3		3	3	3		3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0		3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0		2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0		2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru		A			Thru				
Right		A	A		Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right		A	A		EB Right	A			
SB Right					WB Right	A			
Green		49.9	7.4	0.0		47.1	0.0		
Yellow		4.5	4.5			3.6			
All Red		1.0	1.0			1.0			

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1358	620		772	350	1018		692			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		1429	653		813	368	1072		728			
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
Lane group		T	R		T	R	L		R			
Adj flow		1429	653		813	368	1072		728			
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R		L	R				
So	1900	1900		1900	1900		1900	1900				
Lanes	0 2	1	0	3	1	0	2	1	0	0	0	
fW	1.000	1.000		1.000	1.000		1.000	1.000				
fHV	0.980	0.980		0.980	0.980		0.980	0.980				
fG	1.000	1.000		1.000	1.000		1.000	1.000				
fP	1.000	1.000		1.000	1.000		1.000	1.000				
fBB	1.000	1.000		1.000	1.000		1.000	1.000				
fA	1.000	1.000		1.000	1.000		1.000	1.000				
fLU	0.952	1.000		0.908	1.000		0.971	1.000				
fRT	1.000	0.850		1.000	0.850			0.850				
fLT	1.000			1.000			0.950					
Sec.												
fLpb	1.000			1.000			1.000					
fRpb	1.000	1.000		1.000	1.000			1.000				
S	3547	1583		5074	1583		3437	1583				
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1429	3547		0.40	0.42	1475	0.97
Right	R	653	1583		0.41	1.00	1583	0.41
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	813	5074	#	0.16	0.52	2655	0.31
Right	R	368	1583		0.23	1.00	1583	0.23
Northbound								
Prot								
Perm								
Left	L	1072	3437	#	0.31	0.39	1349	0.79
Prot								
Perm								
Thru								
Right	R	728	1583		0.46	1.00	1583	0.46
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.47
Total lost time per cycle, L = 10.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.52

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.97	0.42	34.3	1.000	1475	0.48	16.5	0.0	50.8	D	34.9	C
R	0.41	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Westbound												
T	0.31	0.52	16.2	1.000	2655	0.11	0.1	0.0	16.3	B	11.2	B
R	0.23	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Northbound												
L	0.79	0.39	32.2	1.000	1349	0.34	3.4	0.0	35.6	D		
											21.3	C
R	0.46	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

Intersection delay = 24.6 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	120.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

	0.0						0.0	
T	0.0	0.00	35.0	34.3	0.00	0.0	0.0	50.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
	0.0						0.0	
T	0.0	0.00	28.6	16.2	0.00	0.0	0.0	16.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Northbound								
L	0.0	0.00	36.5	32.2	0.00	0.0	0.0	35.6
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 24.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	T	R	T	R	L	R		
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0		
Flow Rate	750	653	298	368	552	728		
So	1900	1900	1900	1900	1900	1900		
No.Lanes	0 2	1	0 3	1	2 0	1	0 0	0
SL	1862	1583	1862	1583	1770	1583		
LnCapacity	774	1583	974	1583	694	1583		
Flow Ratio	0.4	0.4	0.2	0.2	0.3	0.5		
v/c Ratio	0.97	0.41	0.31	0.23	0.80	0.46		
Grn Ratio	0.42	1.00	0.52	1.00	0.39	1.00		
I Factor	1.000		1.000		1.000			
AT or PVG	3	3	3	3	3	3		
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
PF2	1.00		1.00		1.00			
Q1	24.5		5.6		16.3			
kB	0.7	1.1	0.8	1.1	0.7	1.1		
Q2	6.8	0.8	0.4	0.3	2.3	0.9		
Q Average	31.2		6.0		18.5			
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0		
Q Storage	0	0	0	0	0	0		
Q S Ratio								
70th Percentile Output:								
fB%	1.1		1.2		1.2			
BOQ	35.8		7.1		21.5			
QSRatio								
85th Percentile Output:								
fB%	1.4		1.5		1.5			
BOQ	43.9		9.3		27.1			
QSRatio								
90th Percentile Output:								
fB%	1.5		1.7		1.6			
BOQ	46.3		10.2		28.9			
QSRatio								
95th Percentile Output:								
fB%	1.6		1.9		1.7			
BOQ	50.1		11.6		31.8			
QSRatio								
98th Percentile Output:								
fB%	1.8		2.3		1.9			
BOQ	55.9		14.0		35.9			
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 NB Ramps

Inter.: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Volume		937	761		1720	1172	684		275			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left A			
Thru	A	A			Thru			
Right	A	A			Right A			
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right A			
SB Right					WB Right A			
Green	23.0	8.0	0.0		16.4	0.0		
Yellow	1.5	4.5			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1980	3547	0.50	0.56	8.3	A	4.7	A
R	1583	1583	0.51	1.00	0.3	A		
Westbound								
T	2833	5074	0.64	0.56	9.6	A	6.7	A
R	1583	1583	0.78	1.00	2.6	A		
Northbound								
L	939	3437	0.77	0.27	23.9	C		
							17.1	B
R	1583	1583	0.18	1.00	0.1	A		
Southbound								

Intersection Delay = 7.9 (sec/veh) Intersection LOS = A

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Macarthur at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		937	761		1720	1172	684		275			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		247	200		453	308	180		72			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900		1900			
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			
Adj Flow		986	801		1811	1234	720		289			
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			
Peds Bikes	0			0			0			0		
Buses		0	0		0	0	0		0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0		0.0			
Arriv. Type		3	3		3	3	3		3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0		3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0		2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0		2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right	A		
SB Right					WB Right	A		
Green	23.0	8.0	0.0			16.4	0.0	
Yellow	1.5	4.5				3.6		
All Red	1.0	1.0				1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		937	761		1720	1172	684		275			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		986	801		1811	1234	720		289			
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
Lane group		T	R		T	R	L		R			
Adj flow		986	801		1811	1234	720		289			
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R		L	R				
So	1900	1900		1900	1900		1900	1900				
Lanes	0 2	1	0	3	1	0	2	1	0	0	0	
fW	1.000	1.000		1.000	1.000		1.000	1.000				
fHV	0.980	0.980		0.980	0.980		0.980	0.980				
fG	1.000	1.000		1.000	1.000		1.000	1.000				
fP	1.000	1.000		1.000	1.000		1.000	1.000				
fBB	1.000	1.000		1.000	1.000		1.000	1.000				
fA	1.000	1.000		1.000	1.000		1.000	1.000				
fLU	0.952	1.000		0.908	1.000		0.971	1.000				
fRT	1.000	0.850		1.000	0.850			0.850				
fLT	1.000			1.000			0.950					
Sec.												
fLpb	1.000			1.000			1.000					
fRpb	1.000	1.000		1.000	1.000			1.000				
S	3547	1583		5074	1583		3437	1583				
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	986	3547		0.28	0.56	1980	0.50
Right	R	801	1583		0.51	1.00	1583	0.51
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1811	5074		0.36	0.56	2833	0.64
Right	R	1234	1583	#	0.78	1.00	1583	0.78
Northbound								
Prot								
Perm								
Left	L	720	3437		0.21	0.27	939	0.77
Prot								
Perm								
Thru								
Right	R	289	1583		0.18	1.00	1583	0.18
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.78
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.78

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.50	0.56	8.1	1.000	1980	0.11	0.2	0.0	8.3	A	4.7	A
R	0.51	1.00	0.0	0.950	1583	0.11	0.3	0.0	0.3	A		
Westbound												
T	0.64	0.56	9.1	1.000	2833	0.22	0.5	0.0	9.6	A	6.7	A
R	0.78	1.00	0.0	0.950	1583	0.33	2.6	0.0	2.6	A		
Northbound												
L	0.77	0.27	20.0	1.000	939	0.32	3.9	0.0	23.9	C		
											17.1	B
R	0.18	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

Intersection delay = 7.9 (sec/veh) Intersection LOS = A

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	13.3	8.1	0.00	0.0	0.0	8.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.3
Westbound								
	0.0						0.0	
T	0.0	0.00	13.3	9.1	0.00	0.0	0.0	9.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.6
Northbound								
L	0.0	0.00	21.8	20.0	0.00	0.0	0.0	23.9
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 7.9 sec/veh Intersection LOS A

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound				Southbound		
LaneGroup	T	R	T	R	L		R				
Init Queue	0.0	0.0	0.0	0.0	0.0		0.0				
Flow Rate	517	801	664	1234	370		289				
So	1900	1900	1900	1900	1900		1900				
No.Lanes	0 2	1	0 3	1	2	0	1		0	0	0
SL	1862	1583	1862	1583	1770		1583				
LnCapacity	1039	1583	1040	1583	483		1583				
Flow Ratio	0.3	0.5	0.4	0.8	0.2		0.2				
v/c Ratio	0.50	0.51	0.64	0.78	0.77		0.18				
Grn Ratio	0.56	1.00	0.56	1.00	0.27		1.00				
I Factor	1.000		1.000		1.000						
AT or PVG	3	3	3	3	3		3				
Pltn Ratio	1.00	1.00	1.00	1.00	1.00		1.00				
PF2	1.00		1.00		1.00						
Q1	5.3		7.6		5.7						
kB	0.6	0.7	0.6	0.7	0.3		0.7				
Q2	0.5	0.7	1.0	2.4	1.1		0.2				
Q Average	5.8		8.6		6.7						
Q Spacing	25.0	25.0	25.0	25.0	25.0		25.0				
Q Storage	0	0	0	0	0		0				
Q S Ratio											
70th Percentile Output:											
fB%	1.2		1.2		1.2						
BOQ	6.9		10.1		8.0						
QSRatio											
85th Percentile Output:											
fB%	1.5		1.5		1.5						
BOQ	9.0		13.0		10.4						
QSRatio											
90th Percentile Output:											
fB%	1.7		1.7		1.7						
BOQ	9.9		14.2		11.3						
QSRatio											
95th Percentile Output:											
fB%	1.9		1.9		1.9						
BOQ	11.2		16.0		12.9						
QSRatio											
98th Percentile Output:											
fB%	2.3		2.2		2.3						
BOQ	13.6		19.0		15.5						
QSRatio											

HCS+: Signalized Intersections Release 5.4

Analyst: Robert Chan
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 SB Ramps

Inter.: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Volume		1331	752		1406	153				886		943
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	12.4	8.8	0.0		23.3	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1578	3547	0.89	0.45	21.9	C	14.1	B
R	1583	1583	0.50	1.00	0.3	A		
Westbound								
T	2258	5074	0.66	0.45	13.7	B	12.4	B
R	1583	1583	0.10	1.00	0.0+	A		
Northbound								
Southbound								
L	1335	3437	0.70	0.39	17.0	B		
							23.2	C
R	1088	2803	0.91	0.39	28.9	C		

Intersection Delay = 16.6 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	Robert Chan
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Macarthur at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 SB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1331	752		1406	153				886		943
% Heavy Veh		2	2		2	2				2		2
PHF		0.95	0.95		0.95	0.95				0.95		0.95
PK 15 Vol		350	198		370	40				233		248
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900		1900	1900				1900		1900
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
LGConfig		T	R		T	R				L		R
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0
Adj Flow		1401	792		1480	161				933		993
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000
Peds Bikes	0			0			0			0		
Buses		0	0		0	0				0		0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0				0.0		0.0
Arriv. Type		3	3		3	3				3		3
Unit Ext.		3.0	3.0		3.0	3.0				3.0		3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0		2.0	2.0				2.0		2.0
Ext of g		2.0	2.0		2.0	2.0				2.0		2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	12.4	8.8	0.0		23.3	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1331	752		1406	153				886		943
PHF		0.95	0.95		0.95	0.95				0.95		0.95
Adj flow		1401	792		1480	161				933		993
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
Lane group		T	R		T	R				L		R
Adj flow		1401	792		1480	161				933		993
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R					L		R
So	1900	1900		1900	1900					1900		1900
Lanes	0 2	1	0	3	1	0	0	0		2	0	2
fW	1.000	1.000		1.000	1.000					1.000		1.000
fHV	0.980	0.980		0.980	0.980					0.980		0.980
fG	1.000	1.000		1.000	1.000					1.000		1.000
fP	1.000	1.000		1.000	1.000					1.000		1.000
fBB	1.000	1.000		1.000	1.000					1.000		1.000
fA	1.000	1.000		1.000	1.000					1.000		1.000
fLU	0.952	1.000		0.908	1.000					0.971		0.885
fRT	1.000	0.850		1.000	0.850							0.850
fLT	1.000			1.000						0.950		
Sec.												
fLpb	1.000			1.000						1.000		
fRpb	1.000	1.000		1.000	1.000							1.000
S	3547	1583		5074	1583					3437		2803
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1401	3547	#	0.39	0.45	1578	0.89
Right	R	792	1583		0.50	1.00	1583	0.50
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1480	5074		0.29	0.45	2258	0.66
Right	R	161	1583		0.10	1.00	1583	0.10
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	933	3437		0.27	0.39	1335	0.70
Prot								
Perm								
Thru								
Right	R	993	2803	#	0.35	0.39	1088	0.91

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.75
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.90

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.89	0.45	15.3	1.000	1578	0.41	6.6	0.0	21.9	C	14.1	B
R	0.50	1.00	0.0	0.950	1583	0.11	0.3	0.0	0.3	A		
Westbound												
T	0.66	0.45	13.0	1.000	2258	0.23	0.7	0.0	13.7	B	12.4	B
R	0.10	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Northbound												
Southbound												
L	0.70	0.39	15.4	1.000	1335	0.27	1.6	0.0	17.0	B		

									23.2	C
R	0.91	0.39	17.4	1.000	1088	0.43	11.5	0.0	28.9	C

Intersection delay = 16.6 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	16.6	15.3	0.00	0.0	0.0	21.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.3
Westbound								
	0.0						0.0	
T	0.0	0.00	16.6	13.0	0.00	0.0	0.0	13.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
L	0.0	0.00	18.4	15.4	0.00	0.0	0.0	17.0
	0.0						0.0	
R	0.0	0.00	18.4	17.4	0.00	0.0	0.0	28.9

Intersection Delay 16.6 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	T	R		T	R					L	R	
Init Queue	0.0	0.0		0.0	0.0					0.0	0.0	
Flow Rate	735	792		543	161					480	561	
So	1900	1900		1900	1900					1900	1900	
No.Lanes	2	1	0	3	1	0	0	0		2	2	
SL	1862	1583		1862	1583					1770	1584	
LnCapacity	828	1583		828	1583					687	614	
Flow Ratio	0.4	0.5		0.3	0.1					0.3	0.4	
v/c Ratio	0.89	0.50		0.66	0.10					0.70	0.91	
Grn Ratio	0.45	1.00		0.45	1.00					0.39	0.39	
I Factor	1.000			1.000						1.000		
AT or PVG	3	3		3	3					3	3	
Pltn Ratio	1.00	1.00		1.00	1.00					1.00	1.00	
PF2	1.00			1.00						1.00	1.00	
Q1	11.2			7.1						6.7	8.9	
kB	0.5	0.7		0.5	0.7					0.4	0.4	
Q2	3.0	0.7		0.9	0.1					1.0	3.0	
Q Average	14.3			8.0						7.7	11.8	
Q Spacing	25.0	25.0		25.0	25.0					25.0	25.0	
Q Storage	0	0		0	0					0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2			1.2						1.2	1.2	
BOQ	16.7			9.4						9.1	13.9	
QSRatio												
85th Percentile Output:												
fB%	1.5			1.5						1.5	1.5	
BOQ	21.2			12.2						11.8	17.8	
QSRatio												
90th Percentile Output:												
fB%	1.6			1.7						1.7	1.6	
BOQ	22.8			13.3						12.8	19.2	
QSRatio												
95th Percentile Output:												
fB%	1.8			1.9						1.9	1.8	
BOQ	25.3			15.1						14.5	21.4	
QSRatio												
98th Percentile Output:												
fB%	2.0			2.2						2.3	2.1	
BOQ	29.0			17.9						17.3	24.9	
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 SB Ramps

Inter.: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Volume		1302	980		1770	710				308		760
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	17.6	7.4	0.0		19.5	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1803	3547	0.76	0.51	13.8	B	8.3	A
R	1583	1583	0.65	1.00	1.0	A		
Westbound								
T	2579	5074	0.72	0.51	12.5	B	9.0	A
R	1583	1583	0.47	1.00	0.2	A		
Northbound								
Southbound								
L	1117	3437	0.29	0.32	15.2	B		
							25.0	C
R	911	2803	0.88	0.32	28.9	C		

Intersection Delay = 11.6 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Macarthur at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 SB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1302	980		1770	710				308		760
% Heavy Veh		2	2		2	2				2		2
PHF		0.95	0.95		0.95	0.95				0.95		0.95
PK 15 Vol		343	258		466	187				81		200
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900		1900	1900				1900		1900
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
LGConfig		T	R		T	R				L		R
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0
Adj Flow		1371	1032		1863	747				324		800
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000
Peds Bikes	0			0			0			0		
Buses		0	0		0	0				0		0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0				0.0		0.0
Arriv. Type		3	3		3	3				3		3
Unit Ext.		3.0	3.0		3.0	3.0				3.0		3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0		2.0	2.0				2.0		2.0
Ext of g		2.0	2.0		2.0	2.0				2.0		2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	17.6	7.4	0.0		19.5	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1302	980		1770	710				308		760
PHF		0.95	0.95		0.95	0.95				0.95		0.95
Adj flow		1371	1032		1863	747				324		800
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
Lane group		T	R		T	R				L		R
Adj flow		1371	1032		1863	747				324		800
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R					L		R
So	1900	1900		1900	1900					1900		1900
Lanes	0 2	1	0	3	1	0	0	0		2	0	2
fW	1.000	1.000		1.000	1.000					1.000		1.000
fHV	0.980	0.980		0.980	0.980					0.980		0.980
fG	1.000	1.000		1.000	1.000					1.000		1.000
fP	1.000	1.000		1.000	1.000					1.000		1.000
fBB	1.000	1.000		1.000	1.000					1.000		1.000
fA	1.000	1.000		1.000	1.000					1.000		1.000
fLU	0.952	1.000		0.908	1.000					0.971		0.885
fRT	1.000	0.850		1.000	0.850							0.850
fLT	1.000			1.000						0.950		
Sec.												
fLpb	1.000			1.000						1.000		
fRpb	1.000	1.000		1.000	1.000							1.000
S	3547	1583		5074	1583					3437		2803
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1371	3547	#	0.39	0.51	1803	0.76
Right	R	1032	1583		0.65	1.00	1583	0.65
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1863	5074		0.37	0.51	2579	0.72
Right	R	747	1583		0.47	1.00	1583	0.47
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	324	3437		0.09	0.32	1117	0.29
Prot								
Perm								
Thru								
Right	R	800	2803	#	0.29	0.32	911	0.88

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.67
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.81

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.76	0.51	11.8	1.000	1803	0.31	1.9	0.0	13.8	B	8.3	A
R	0.65	1.00	0.0	0.950	1583	0.23	1.0	0.0	1.0	A		
Westbound												
T	0.72	0.51	11.5	1.000	2579	0.28	1.0	0.0	12.5	B	9.0	A
R	0.47	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Northbound												
Southbound												
L	0.29	0.32	15.1	1.000	1117	0.11	0.1	0.0	15.2	B		

									25.0	C
R	0.88	0.32	19.1	1.000	911	0.40	9.8	0.0	28.9	C

Intersection delay = 11.6 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	14.8	11.8	0.00	0.0	0.0	13.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.0
Westbound								
	0.0						0.0	
T	0.0	0.00	14.8	11.5	0.00	0.0	0.0	12.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
L	0.0	0.00	20.3	15.1	0.00	0.0	0.0	15.2
	0.0						0.0	
R	0.0	0.00	20.3	19.1	0.00	0.0	0.0	28.9

Intersection Delay 11.6 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound			Southbound		
LaneGroup	T	R	T	R				L		R
Init Queue	0.0	0.0	0.0	0.0				0.0		0.0
Flow Rate	720	1032	683	747				166		451
So	1900	1900	1900	1900				1900		1900
No.Lanes	0 2	1	0 3	1	0	0	0	2	0	2
SL	1862	1583	1862	1583				1770		1584
LnCapacity	946	1583	946	1583				575		514
Flow Ratio	0.4	0.7	0.4	0.5				0.1		0.3
v/c Ratio	0.76	0.65	0.72	0.47				0.29		0.88
Grn Ratio	0.51	1.00	0.51	1.00				0.32		0.32
I Factor	1.000		1.000					1.000		
AT or PVG	3	3	3	3				3		3
Pltn Ratio	1.00	1.00	1.00	1.00				1.00		1.00
PF2	1.00		1.00					1.00		1.00
Q1	9.6		8.8					2.1		7.1
kB	0.5	0.7	0.5	0.7				0.4		0.4
Q2	1.6	1.3	1.3	0.6				0.2		2.1
Q Average	11.2		10.1					2.2		9.2
Q Spacing	25.0	25.0	25.0	25.0				25.0		25.0
Q Storage	0	0	0	0				0		0
Q S Ratio										
70th Percentile Output:										
fB%	1.2		1.2					1.2		1.2
BOQ	13.2		12.0					2.6		10.8
QSRatio										
85th Percentile Output:										
fB%	1.5		1.5					1.6		1.5
BOQ	16.9		15.4					3.5		13.9
QSRatio										
90th Percentile Output:										
fB%	1.6		1.6					1.8		1.7
BOQ	18.2		16.7					3.9		15.1
QSRatio										
95th Percentile Output:										
fB%	1.8		1.8					2.0		1.9
BOQ	20.4		18.7					4.5		17.0
QSRatio										
98th Percentile Output:										
fB%	2.1		2.2					2.5		2.2
BOQ	23.8		21.9					5.6		20.1
QSRatio										

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 NB Ramps

Inter.: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Dyer Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L	LTR	R			
Volume		1890	550		1100	360	830	0	700			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru	A			
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right					EB Right	A			
SB Right					WB Right				
Green	23.3	11.0	0.0			46.1	0.0		
Yellow	4.0	4.0				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	2099	5074	0.95	0.41	36.9	D	28.6	C
R	1583	1583	0.37	1.00	0.1	A		
Westbound								
TR	2021	4886	0.76	0.41	25.6	C	25.6	C
Northbound								
L	859	1770	1.02	0.49	59.6	E		
LTR	904	1863	0.00	0.49	12.6	B	53.6	D
R	768	1583	0.96	0.49	46.6	D		
Southbound								

Intersection Delay = 34.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Dyer at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 NB Ramps N/S St: Dyer Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1890	550		1100	360	830	0	700			
% Heavy Veh		2	2		2	2	2	2	2			
PHF		0.95	0.95		0.95	0.95	0.95	0.92	0.95			
PK 15 Vol		497	145		289	95	218	0	184			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900		1900	1900	1900			
ParkExist												
NumPark												
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L	LTR	R			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol		0			0			0				
Adj Flow		1989	579		1537		874	0	737			
%InSharedLn							0		0			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.247			0.000	1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0		0	0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0		0.0	0.0	0.0			
Arriv. Type		3	3		3		3	3	3			
Unit Ext.		3.0	3.0		3.0		3.0	3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0		2.0	2.0	2.0			
Ext of g		2.0	2.0		2.0		2.0	2.0	2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right			
Green	23.3	11.0	0.0			46.1	0.0	
Yellow	4.0	4.0				3.6		
All Red	1.0	1.0				1.0		

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1890	550		1100	360	830	0	700			
PHF		0.95	0.95		0.95	0.95	0.95	0.92	0.95			
Adj flow		1989	579		1158	379	874	0	737			
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
Lane group		T	R		TR		L	LTR	R			
Adj flow		1989	579		1537		874	0	737			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.247			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		TR			L	LTR	R			
So	1900	1900		1900			1900	1900	1900			
Lanes	0 3	0 1	0	0 3	0		0 1	0 1	0 1	0	0	0
fW	1.000	1.000		1.000			1.000	1.000	1.000			
fHV	0.980	0.980		0.980			0.980	0.980	0.980			
fG	1.000	1.000		1.000			1.000	1.000	1.000			
fP	1.000	1.000		1.000			1.000	1.000	1.000			
fBB	1.000	1.000		1.000			1.000	1.000	1.000			
fA	1.000	1.000		1.000			1.000	1.000	1.000			
fLU	0.908	1.000		0.908			1.000	1.000	1.000			
fRT	1.000	0.850		0.963				1.000	0.850			
fLT	1.000			1.000			0.950	1.000				
Sec.												
fLpb	1.000			1.000			1.000	1.000				
fRpb	1.000	1.000		1.000				1.000	1.000			
S	5074	1583		4886			1770	1863	1583			
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1989	5074	#	0.39	0.41	2099	0.95
Right	R	579	1583		0.37	1.00	1583	0.37
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1537	4886		0.31	0.41	2021	0.76
Right								
Northbound								
Prot								
Perm								
Left	L	874	1770	#	0.49	0.49	859	1.02
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.49	904	0.00
Right	R	737	1583		0.47	0.49	768	0.96
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.89
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.99

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.95	0.41	26.9	1.000	2099	0.46	10.0	0.0	36.9	D	28.6	C
R	0.37	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Westbound												
TR	0.76	0.41	23.8	1.000	2021	0.31	1.7	0.0	25.6	C	25.6	C
Northbound												
L	1.02	0.49	24.4	1.000	859	0.50	35.2	0.0	59.6	E		
LTR	0.00	0.49	12.6	1.000	904	0.11	0.0	0.0	12.6	B	53.6	D
R	0.96	0.49	23.6	1.000	768	0.47	23.0	0.0	46.6	D		
Southbound												

Intersection delay = 34.8 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	27.8	26.9	0.00	0.0	0.0	36.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Westbound								
	0.0						0.0	
TR	0.0	0.00	27.8	23.8	0.00	0.0	0.0	25.6
	0.0						0.0	
Northbound								
L	0.0	0.00	24.4	24.4	0.00	3.7	0.0	59.6
LTR	0.0	0.00	24.4	12.6	0.00	0.0	0.0	12.6
R	0.0	0.00	24.4	23.6	0.00	0.0	0.0	46.6
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 34.8 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound	Northbound			Southbound
LaneGroup	T	R	TR	L	LTR	R	
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate	730	579	564	874	0	737	
So	1900	1900	1900	1900	1900	1900	
No.Lanes	0 3	1	0 3 0	1	1	1	0 0 0
SL	1862	1583	1793	1770	1863	1583	
LnCapacity	770	1583	741	859	904	768	
Flow Ratio	0.4	0.4	0.3	0.5	0.0	0.5	
v/c Ratio	0.95	0.37	0.76	1.02	0.00	0.96	
Grn Ratio	0.41	1.00	0.41	0.49	0.49	0.49	
I Factor	1.000		1.000		1.000		
AT or PVG	3	3	3	3	3	3	
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF2	1.00		1.00	1.00	1.00	1.00	
Q1	18.6		12.7	23.1	0.0	18.7	
kB	0.6	0.9	0.6	0.7	0.7	0.6	
Q2	5.4	0.5	1.8	9.4	0.0	5.8	
Q Average	23.9		14.5	32.5	0.0	24.5	
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage	0	0	0	0	0	0	
Q S Ratio							
70th Percentile Output:							
fB%	1.2		1.2	1.1	1.2	1.2	
BOQ	27.7		17.0	37.2	0.0	28.3	
QSRatio							
85th Percentile Output:							
fB%	1.4		1.5	1.4	1.6	1.4	
BOQ	34.4		21.5	45.5	0.0	35.1	
QSRatio							
90th Percentile Output:							
fB%	1.5		1.6	1.5	1.8	1.5	
BOQ	36.4		23.1	48.0	0.0	37.2	
QSRatio							
95th Percentile Output:							
fB%	1.7		1.8	1.6	2.1	1.7	
BOQ	39.7		25.6	51.9	0.0	40.6	
QSRatio							
98th Percentile Output:							
fB%	1.9		2.0	1.8	2.7	1.9	
BOQ	44.5		29.4	57.9	0.0	45.4	
QSRatio							

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 NB Ramps

Inter.: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Dyer Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L	LTR	R			
Volume		1177	1020		1602	1250	238	0	83			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru	A			
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right					EB Right	A			
SB Right					WB Right				
Green	23.0	34.0	0.0			13.3	0.0		
Yellow	4.0	4.0				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 84.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	3705	5074	0.33	0.73	4.1	A	2.8	A
R	1583	1583	0.68	1.00	1.2	A		
Westbound								
TR	3461	4740	0.87	0.73	11.0	B	11.0	B
Northbound								
L	277	1770	0.91	0.16	66.1	E		
LTR	292	1863	0.00	0.16	30.2	C	57.5	E
R	248	1583	0.35	0.16	32.8	C		
Southbound								

Intersection Delay = 10.4 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/17/09
Analysis Time Period: PM
Intersection: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: 2015
Project ID: IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 NB Ramps N/S St: Dyer Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1177	1020		1602	1250	238	0	83			
% Heavy Veh		2	2		2	2	2	2	2			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
PK 15 Vol		310	268		422	329	63	0	22			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900		1900	1900	1900			
ParkExist												
NumPark												
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L	LTR	R			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol		0			0			0				
Adj Flow		1239	1074		3002		251	0	87			
%InSharedLn							0		0			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.438			0.000	1.000			
Peds Bikes	0			0			0			0		
Buses		0	0		0		0	0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0		0.0	0.0	0.0			
Arriv. Type		3	3		3		3	3	3			
Unit Ext.		3.0	3.0		3.0		3.0	3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0		2.0	2.0	2.0			
Ext of g		2.0	2.0		2.0		2.0	2.0	2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right			
Green	23.0	34.0	0.0			13.3	0.0	
Yellow	4.0	4.0				3.6		
All Red	1.0	1.0				1.0		

Cycle Length: 84.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1177	1020		1602	1250	238	0	83			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
Adj flow		1239	1074		1686	1316	251	0	87			
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
Lane group		T	R		TR		L	LTR	R			
Adj flow		1239	1074		3002		251	0	87			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.438			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		TR			L	LTR	R			
So	1900	1900		1900			1900	1900	1900			
Lanes	0 3	0 1	0	3	0		1	1	1	0	0	0
fW	1.000	1.000		1.000			1.000	1.000	1.000			
fHV	0.980	0.980		0.980			0.980	0.980	0.980			
fG	1.000	1.000		1.000			1.000	1.000	1.000			
fP	1.000	1.000		1.000			1.000	1.000	1.000			
fBB	1.000	1.000		1.000			1.000	1.000	1.000			
fA	1.000	1.000		1.000			1.000	1.000	1.000			
fLU	0.908	1.000		0.908			1.000	1.000	1.000			
fRT	1.000	0.850		0.934				1.000	0.850			
fLT	1.000			1.000			0.950	1.000				
Sec.												
fLpb	1.000			1.000			1.000	1.000				
fRpb	1.000	1.000		1.000				1.000	1.000			
S	5074	1583		4740			1770	1863	1583			
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1239	5074		0.24	0.73	3705	0.33
Right	R	1074	1583		0.68	1.00	1583	0.68
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	3002	4740	#	0.63	0.73	3461	0.87
Right								
Northbound								
Prot								
Perm								
Left	L	251	1770	#	0.14	0.16	277	0.91
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.16	292	0.00
Right	R	87	1583		0.05	0.16	248	0.35
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.78
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.87

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.33	0.73	4.1	1.000	3705	0.11	0.1	0.0	4.1	A	2.8	A
R	0.68	1.00	0.0	0.950	1583	0.25	1.2	0.0	1.2	A		
Westbound												
TR	0.87	0.73	8.4	1.000	3461	0.40	2.6	0.0	11.0	B	11.0	B
Northbound												
L	0.91	0.16	35.2	1.000	277	0.43	30.9	0.0	66.1	E		
LTR	0.00	0.16	30.2	1.000	292	0.11	0.0	0.0	30.2	C	57.5	E
R	0.35	0.16	31.9	1.000	248	0.11	0.9	0.0	32.8	C		
Southbound												

Intersection delay = 10.4 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 84.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 84.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	84.9 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	11.4	4.1	0.00	0.0	0.0	4.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.2
Westbound								
	0.0						0.0	
TR	0.0	0.00	11.4	8.4	0.00	0.0	0.0	11.0
	0.0						0.0	
Northbound								
L	0.0	0.00	35.8	35.2	0.00	0.0	0.0	66.1
LTR	0.0	0.00	35.8	30.2	0.00	0.0	0.0	30.2
R	0.0	0.00	35.8	31.9	0.00	0.0	0.0	32.8
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 10.4 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound	Northbound			Southbound
LaneGroup	T	R	TR	L	LTR	R	
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate	454	1074	1102	251	0	87	
So	1900	1900	1900	1900	1900	1900	
No.Lanes	0 3	1	0 3 0	1	1	1	0 0 0
SL	1862	1583	1740	1770	1863	1583	
LnCapacity	1360	1583	1270	277	292	248	
Flow Ratio	0.2	0.7	0.6	0.1	0.0	0.1	
v/c Ratio	0.33	0.68	0.87	0.91	0.00	0.35	
Grn Ratio	0.73	1.00	0.73	0.16	0.16	0.16	
I Factor	1.000		1.000		1.000		
AT or PVG	3	3	3	3	3	3	
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF2	1.00		1.00	1.00	1.00	1.00	
Q1	3.8		19.1	5.8	0.0	1.8	
kB	0.8	0.9	0.8	0.3	0.3	0.3	
Q2	0.4	1.8	4.2	1.9	0.0	0.2	
Q Average	4.2		23.3	7.7	0.0	2.0	
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage	0	0	0	0	0	0	
Q S Ratio							
70th Percentile Output:							
fB%	1.2		1.2	1.2	1.2	1.2	
BOQ	5.0		27.0	9.1	0.0	2.4	
QSRatio							
85th Percentile Output:							
fB%	1.6		1.4	1.5	1.6	1.6	
BOQ	6.6		33.6	11.8	0.0	3.1	
QSRatio							
90th Percentile Output:							
fB%	1.7		1.5	1.7	1.8	1.8	
BOQ	7.3		35.6	12.9	0.0	3.5	
QSRatio							
95th Percentile Output:							
fB%	2.0		1.7	1.9	2.1	2.0	
BOQ	8.3		38.8	14.6	0.0	4.0	
QSRatio							
98th Percentile Output:							
fB%	2.4		1.9	2.3	2.7	2.6	
BOQ	10.2		43.6	17.4	0.0	5.1	
QSRatio							

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: AM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 SB Ramps

Inter.: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Grand Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Volume				362		358		889			571	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	20.3	0.0			18.0	6.2	0.0	
Yellow	3.6				4.0	4.0		
All Red	1.0				1.0	1.9		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	599	1770	0.64	0.34	19.0	B		
							20.2	C
R	536	1583	0.70	0.34	21.4	C		
Northbound								
T	1726	3547	0.54	0.49	11.1	B	11.1	B
Southbound								
T	2469	5074	0.24	0.49	9.0	A	9.0	A

Intersection Delay = 13.5 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	AM
Intersection:	Grand at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 SB Ramps N/S St: Grand Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				362	358			889			571	
% Heavy Veh				2	2			2			2	
PHF				0.95	0.95			0.95			0.95	
PK 15 Vol				95	94			234			150	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900			1900			1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						
Adj Flow				381		377		936			601	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	
Peds Bikes	0			0								
Buses				0		0		0			0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0			0.0	
Arriv. Type				3		3		3			3	
Unit Ext.				3.0		3.0		3.0			3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0			2.0	
Ext of g				2.0		2.0		2.0			2.0	
Ped Min g		3.2			3.2							

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right				
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green		20.3	0.0			18.0	6.2	0.0	
Yellow		3.6				4.0	4.0		
All Red		1.0				1.0	1.9		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				362	358			889			571	
PHF				0.95	0.95			0.95			0.95	
Adj flow				381	377			936			601	
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
Lane group				L		R		T			T	
Adj flow				381		377		936			601	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T			T		
So			1900		1900		1900			1900		
Lanes	0	0	1	0	1	0	2	0	0	3	0	
fW			1.000		1.000		1.000			1.000		
fHV			0.980		0.980		0.980			0.980		
fG			1.000		1.000		1.000			1.000		
fP			1.000		1.000		1.000			1.000		
fBB			1.000		1.000		1.000			1.000		
fA			1.000		1.000		1.000			1.000		
fLU			1.000		1.000		0.952			0.908		
fRT					0.850		1.000			1.000		
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000			1.000		
S			1770		1583		3547			5074		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	381	1770		0.22	0.34	599	0.64
Prot								
Perm								
Thru								
Right	R	377	1583	#	0.24	0.34	536	0.70
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	936	3547	#	0.26	0.49	1726	0.54
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	601	5074		0.12	0.49	2469	0.24
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.50
Total lost time per cycle, L = 10.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.61

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor Del k	d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.64	0.34	16.7	1.000	599	0.22	2.2	0.0	19.0	B		
											20.2	C
R	0.70	0.34	17.2	1.000	536	0.27	4.1	0.0	21.4	C		
Northbound												
T	0.54	0.49	10.7	1.000	1726	0.14	0.4	0.0	11.1	B	11.1	B
Southbound												

T 0.24 0.49 9.0 1.000 2469 0.11 0.1 0.0 9.0 A 9.0 A

Intersection delay = 13.5 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.9	16.7	0.00	0.0	0.0	19.0
	0.0						0.0	
R	0.0	0.00	19.9	17.2	0.00	0.0	0.0	21.4
Northbound								
	0.0						0.0	
T	0.0	0.00	15.4	10.7	0.00	0.0	0.0	11.1
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	15.4	9.0	0.00	0.0	0.0	9.0
	0.0						0.0	

Intersection Delay 13.5 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound		Northbound	Southbound
LaneGroup		L	R	T	T
Init Queue		0.0	0.0	0.0	0.0
Flow Rate		381	377	491	220
So		1900	1900	1900	1900
No.Lanes	0 0 0	1 0 1		0 2 0	0 3 0
SL		1770	1583	1862	1862
LnCapacity		599	536	906	906
Flow Ratio		0.2	0.2	0.3	0.1
v/c Ratio		0.64	0.70	0.54	0.24
Grn Ratio		0.34	0.34	0.49	0.49
I Factor		1.000		1.000	1.000
AT or PVG		3	3	3	3
Pltn Ratio		1.00	1.00	1.00	1.00
PF2		1.00	1.00	1.00	1.00
Q1		5.4	5.5	5.7	2.1
kB		0.4	0.4	0.5	0.5
Q2		0.7	0.8	0.6	0.2
Q Average		6.0	6.3	6.3	2.3
Q Spacing		25.0	25.0	25.0	25.0
Q Storage		0	0	0	0
Q S Ratio					
70th Percentile Output:					
fB%		1.2	1.2	1.2	1.2
BOQ		7.2	7.5	7.5	2.7
QSRatio					
85th Percentile Output:					
fB%		1.5	1.5	1.5	1.6
BOQ		9.3	9.7	9.7	3.6
QSRatio					
90th Percentile Output:					
fB%		1.7	1.7	1.7	1.8
BOQ		10.2	10.7	10.7	4.0
QSRatio					
95th Percentile Output:					
fB%		1.9	1.9	1.9	2.0
BOQ		11.6	12.1	12.1	4.7
QSRatio					
98th Percentile Output:					
fB%		2.3	2.3	2.3	2.5
BOQ		14.0	14.6	14.6	5.8
QSRatio					

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/17/09
Period: PM
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 SB Ramps

Inter.: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : 2015
N/S St: Grand Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Volume				330		240		730			710	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	18.9	0.0			16.9	8.7	0.0	
Yellow	3.6				4.0	4.0		
All Red	1.0				1.0	1.9		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	558	1770	0.62	0.31	19.7	B		
							18.8	B
R	499	1583	0.51	0.31	17.6	B		
Northbound								
T	1809	3547	0.42	0.51	9.4	A	9.4	A
Southbound								
T	2588	5074	0.29	0.51	8.5	A	8.5	A

Intersection Delay = 11.7 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/17/09
Analysis Time Period:	PM
Intersection:	Grand at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	2015
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 SB Ramps N/S St: Grand Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				330		240		730			710	
% Heavy Veh				2		2		2			2	
PHF				0.95		0.95		0.95			0.95	
PK 15 Vol				87		63		192			187	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900			1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						
Adj Flow				347		253		768			747	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	
Peds Bikes	0			0								
Buses				0		0		0			0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0			0.0	
Arriv. Type				3		3		3			3	
Unit Ext.				3.0		3.0		3.0			3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0			2.0	
Ext of g				2.0		2.0		2.0			2.0	
Ped Min g		3.2			3.2							

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right				
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green		18.9	0.0			16.9	8.7	0.0	
Yellow		3.6				4.0	4.0		
All Red		1.0				1.0	1.9		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				330		240		730			710	
PHF				0.95		0.95		0.95			0.95	
Adj flow				347		253		768			747	
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
Lane group				L		R		T			T	
Adj flow				347		253		768			747	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T			T		
So				1900		1900	1900			1900		
Lanes	0	0	0	1	0	1	0	2	0	0	3	0
fW				1.000		1.000		1.000			1.000	
fHV				0.980		0.980		0.980			0.980	
fG				1.000		1.000		1.000			1.000	
fP				1.000		1.000		1.000			1.000	
fBB				1.000		1.000		1.000			1.000	
fA				1.000		1.000		1.000			1.000	
fLU				1.000		1.000		0.952			0.908	
fRT						0.850		1.000			1.000	
fLT				0.950				1.000			1.000	
Sec.												
fLpb				1.000				1.000			1.000	
fRpb						1.000		1.000			1.000	
S				1770		1583		3547			5074	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	347	1770	#	0.20	0.31	558	0.62
Prot								
Perm								
Thru								
Right	R	253	1583		0.16	0.31	499	0.51
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	768	3547	#	0.22	0.51	1809	0.42
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	747	5074		0.15	0.51	2588	0.29
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.41
Total lost time per cycle, L = 10.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.50

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.62	0.31	17.5	1.000	558	0.21	2.1	0.0	19.7	B		
											18.8	B
R	0.51	0.31	16.8	1.000	499	0.12	0.9	0.0	17.6	B		
Northbound												
T	0.42	0.51	9.2	1.000	1809	0.11	0.2	0.0	9.4	A	9.4	A
Southbound												

T	0.29	0.51	8.4	1.000	2588	0.11	0.1	0.0	8.5	A	8.5	A

Intersection delay = 11.7 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	20.6	17.5	0.00	0.0	0.0	19.7
	0.0						0.0	
R	0.0	0.00	20.6	16.8	0.00	0.0	0.0	17.6
Northbound								
	0.0						0.0	
T	0.0	0.00	14.7	9.2	0.00	0.0	0.0	9.4
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	14.7	8.4	0.00	0.0	0.0	8.5
	0.0						0.0	

Intersection Delay 11.7 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup		L R	T	T
Init Queue		0.0 0.0	0.0	0.0
Flow Rate		347 253	403	274
So		1900 1900	1900	1900
No.Lanes	0 0 0	1 0 1	0 2 0	0 3 0
SL		1770 1583	1862	1862
LnCapacity		558 499	950	950
Flow Ratio		0.2 0.2	0.2	0.1
v/c Ratio		0.62 0.51	0.42	0.29
Grn Ratio		0.31 0.31	0.51	0.51
I Factor		1.000	1.000	1.000
AT or PVG		3 3	3	3
Pltn Ratio		1.00 1.00	1.00	1.00
PF2		1.00 1.00	1.00	1.00
Q1		4.9 3.4	4.2	2.6
kB		0.4 0.4	0.5	0.5
Q2		0.6 0.4	0.4	0.2
Q Average		5.5 3.8	4.6	2.8
Q Spacing		25.0 25.0	25.0	25.0
Q Storage		0 0	0	0
Q S Ratio				
70th Percentile Output:				
fB%		1.2 1.2	1.2	1.2
BOQ		6.6 4.5	5.5	3.4
QSRatio				
85th Percentile Output:				
fB%		1.5 1.6	1.6	1.6
BOQ		8.6 5.9	7.1	4.5
QSRatio				
90th Percentile Output:				
fB%		1.7 1.7	1.7	1.7
BOQ		9.4 6.6	7.9	5.0
QSRatio				
95th Percentile Output:				
fB%		1.9 2.0	2.0	2.0
BOQ		10.8 7.5	9.0	5.7
QSRatio				
98th Percentile Output:				
fB%		2.4 2.4	2.4	2.5
BOQ		13.0 9.3	11.0	7.1
QSRatio				

Appendix I-5 **Post-2030 Cumulative Baseline No Project HCS Intersection Worksheets**

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study--Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Volume	522		402					1218	241		2183	322
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	12.5	0.0				26.4	5.1	0.0
Yellow	3.6					3.6	4.3	
All Red	1.5					1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1004	4820	0.55	0.21	21.9	C		
							23.9	C
R	584	2803	0.72	0.21	26.6	C		
Westbound								
Northbound								
T	3095	5074	0.41	0.61	6.2	A	5.2	A
R	1583	1583	0.16	1.00	0.0+	A		
Southbound								
T	3095	5074	0.74	0.61	9.3	A	8.1	A
R	1583	1583	0.21	1.00	0.1	A		

Intersection Delay = 10.2 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Culver at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study--Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	522		402					1218	241		2183	322
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	137		106					321	63		574	85
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	549		423					1282	254		2298	339
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	12.5	0.0			26.4	5.1	0.0	
Yellow	3.6				3.6	4.3		
All Red	1.5				1.5	1.5		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	522		402					1218	241		2183	322
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	549		423					1282	254		2298	339
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
Lane group	L		R					T	R		T	R
Adj flow	549		423					1282	254		2298	339
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound			Southbound	
LG	L		R				T	R		T	R
So	1900		1900				1900	1900		1900	1900
Lanes	3	0	2	0	0	0	3	1	0	3	1
fW	1.000		1.000				1.000	1.000		1.000	1.000
fHV	0.980		0.980				0.980	0.980		0.980	0.980
fG	1.000		1.000				1.000	1.000		1.000	1.000
fP	1.000		1.000				1.000	1.000		1.000	1.000
fBB	1.000		1.000				1.000	1.000		1.000	1.000
fA	1.000		1.000				1.000	1.000		1.000	1.000
fLU	0.908		0.885				0.908	1.000		0.908	1.000
fRT			0.850				1.000	0.850		1.000	0.850
fLT	0.950						1.000			1.000	
Sec.											
fLpb	1.000						1.000			1.000	
fRpb			1.000				1.000	1.000		1.000	1.000
S	4820		2803				5074	1583		5074	1583
Sec.											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	549	4820		0.11	0.21	1004	0.55
Prot								
Perm								
Thru								
Right	R	423	2803	#	0.15	0.21	584	0.72
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1282	5074		0.25	0.61	3095	0.41
Right	R	254	1583		0.16	1.00	1583	0.16
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2298	5074	#	0.45	0.61	3095	0.74
Right	R	339	1583		0.21	1.00	1583	0.21

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.60
Total lost time per cycle, L = 10.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.74

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.55	0.21	21.2	1.000	1004	0.15	0.6	0.0	21.9	C		
											23.9	C
R	0.72	0.21	22.1	1.000	584	0.28	4.5	0.0	26.6	C		
Westbound												
Northbound												
T	0.41	0.61	6.1	1.000	3095	0.11	0.1	0.0	6.2	A	5.2	A
R	0.16	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Southbound												

T	0.74	0.61	8.3	1.000	3095	0.30	1.0	0.0	9.3	A	8.1	A
R	0.21	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 10.2 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	23.7	21.2	0.00	0.0	0.0	21.9

	0.0						0.0	
R	0.0	0.00	23.7	22.1	0.00	0.0	0.0	26.6
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	11.7	6.1	0.00	0.0	0.0	6.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Southbound								
	0.0						0.0	
T	0.0	0.00	11.7	8.3	0.00	0.0	0.0	9.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 10.2 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	201	238			470	254	843	339
So	1900	1900			1900	1900	1900	1900
No.Lanes	3 0	2	0 0	0	3	1	3	1
SL	1769	1584			1862	1583	1862	1583
LnCapacity	368	329			1136	1583	1136	1583
Flow Ratio	0.1	0.2			0.3	0.2	0.5	0.2
v/c Ratio	0.55	0.72			0.41	0.16	0.74	0.21
Grn Ratio	0.21	0.21			0.61	1.00	0.61	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	3.0	3.7			4.1		10.0	
kB	0.3	0.3			0.6	0.7	0.6	0.7
Q2	0.4	0.7			0.4	0.1	1.6	0.2
Q Average	3.3	4.4			4.5		11.6	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	4.0	5.2			5.3		13.7	
QSRatio								
85th Percentile Output:								
fB%	1.6	1.6			1.6		1.5	
BOQ	5.2	6.8			7.0		17.5	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.7			1.7		1.6	
BOQ	5.8	7.5			7.7		18.9	
QSRatio								
95th Percentile Output:								
fB%	2.0	2.0			2.0		1.8	
BOQ	6.7	8.6			8.8		21.1	
QSRatio								
98th Percentile Output:								
fB%	2.5	2.4			2.4		2.1	
BOQ	8.3	10.6			10.8		24.5	
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Volume	1048		912					1983	301		1486	251
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	29.9	0.0				23.0	11.1	0.0
Yellow	3.6					3.6	4.3	
All Red	1.5					1.5	1.5	

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1801	4820	0.61	0.37	21.0	C		
							28.0	C
R	1048	2803	0.92	0.37	36.1	D		
Westbound								
Northbound								
T	2486	5074	0.84	0.49	20.4	C	17.7	B
R	1583	1583	0.20	1.00	0.1	A		
Southbound								
T	2486	5074	0.63	0.49	15.6	B	13.3	B
R	1583	1583	0.17	1.00	0.1	A		

Intersection Delay = 19.8 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Culver at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	1048		912					1983	301		1486	251
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	276		240					522	79		391	66
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	1103		960					2087	317		1564	264
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	29.9	0.0			23.0	11.1	0.0	
Yellow	3.6				3.6	4.3		
All Red	1.5				1.5	1.5		

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	1048		912					1983	301		1486	251
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	1103		960					2087	317		1564	264
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
Lane group	L		R					T	R		T	R
Adj flow	1103		960					2087	317		1564	264
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound			Southbound	
LG	L		R				T	R		T	R
So	1900		1900				1900	1900		1900	1900
Lanes	3	0	2	0	0	0	3	1	0	3	1
fW	1.000		1.000				1.000	1.000		1.000	1.000
fHV	0.980		0.980				0.980	0.980		0.980	0.980
fG	1.000		1.000				1.000	1.000		1.000	1.000
fP	1.000		1.000				1.000	1.000		1.000	1.000
fBB	1.000		1.000				1.000	1.000		1.000	1.000
fA	1.000		1.000				1.000	1.000		1.000	1.000
fLU	0.908		0.885				0.908	1.000		0.908	1.000
fRT			0.850				1.000	0.850		1.000	0.850
fLT	0.950						1.000			1.000	
Sec.											
fLpb	1.000						1.000			1.000	
fRpb			1.000				1.000	1.000		1.000	1.000
S	4820		2803				5074	1583		5074	1583
Sec.											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	1103	4820		0.23	0.37	1801	0.61
Prot								
Perm								
Thru								
Right	R	960	2803	#	0.34	0.37	1048	0.92
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2087	5074	#	0.41	0.49	2486	0.84
Right	R	317	1583		0.20	1.00	1583	0.20
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1564	5074		0.31	0.49	2486	0.63
Right	R	264	1583		0.17	1.00	1583	0.17

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.75
Total lost time per cycle, L = 10.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.87

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.61	0.37	20.3	1.000	1801	0.20	0.6	0.0	21.0	C		
											28.0	C
R	0.92	0.37	23.9	1.000	1048	0.43	12.3	0.0	36.1	D		
Westbound												
Northbound												
T	0.84	0.49	17.7	1.000	2486	0.37	2.7	0.0	20.4	C	17.7	B
R	0.20	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.63	0.49	15.0	1.000	2486	0.21	0.5	0.0	15.6	B	13.3	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 19.8 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	80.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	80.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT				0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	25.0	20.3	0.00	0.0	0.0	21.0

	0.0						0.0	
R	0.0	0.00	25.0	23.9	0.00	0.0	0.0	36.1
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	20.4	17.7	0.00	0.0	0.0	20.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	20.4	15.0	0.00	0.0	0.0	15.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 19.8 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	404	542			766	317	574	264
So	1900	1900			1900	1900	1900	1900
No.Lanes	3 0 2		0 0 0		0 3	1	0 3	1
SL	1769	1584			1862	1583	1862	1583
LnCapacity	661	592			912	1583	912	1583
Flow Ratio	0.2	0.3			0.4	0.2	0.3	0.2
v/c Ratio	0.61	0.92			0.84	0.20	0.63	0.17
Grn Ratio	0.37	0.37			0.49	1.00	0.49	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	7.3	11.5			14.8		9.4	
kB	0.5	0.5			0.6	0.8	0.6	0.8
Q2	0.8	3.3			2.8	0.2	1.0	0.2
Q Average	8.1	14.8			17.5		10.4	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	9.5	17.3			20.4		12.3	
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5			1.5		1.5	
BOQ	12.3	21.9			25.7		15.7	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.6			1.6		1.6	
BOQ	13.4	23.5			27.5		17.1	
QSRatio								
95th Percentile Output:								
fB%	1.9	1.8			1.7		1.8	
BOQ	15.2	26.1			30.3		19.1	
QSRatio								
98th Percentile Output:								
fB%	2.2	2.0			2.0		2.1	
BOQ	18.0	29.9			34.3		22.4	
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 NB Ramps

Inter.: Jamboree at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Volume				1172	0	510		1320	670		1878	470
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left	A				SB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	52.2	0.0				12.8	9.8	0.0	
Yellow	3.6					4.3	4.3		
All Red	1.0					1.0	1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1027	1770	1.20	0.58	119.1	F		
LTR	1081	1863	0.00	0.58	7.9	A	86.9	F
R	918	1583	0.58	0.58	13.0	B		
Northbound								
T	2097	6765	0.66	0.31	27.8	C	18.5	B
R	1583	1583	0.45	1.00	0.2	A		
Southbound								
T	2097	6765	0.94	0.31	39.7	D	31.8	C
R	1583	1583	0.31	1.00	0.1	A		

Intersection Delay = 42.8 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1172	0	510		1320	670		1878	470
% Heavy Veh				2	2	2		2	2		2	2
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
PK 15 Vol				308	0	134		347	176		494	124
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0		12.0	12.0
RTOR Vol						0				0			0
Adj Flow				1234	0	537		1389	705		1977	495
%InSharedLn				0		0						
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0		0.0	0.0
Arriv. Type				3	3	3		3	3		3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		52.2	0.0			12.8	9.8	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1172	0	510		1320	670		1878	470
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
Adj flow				1234	0	537		1389	705		1977	495
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
Lane group				L		LTR	R		T	R		T	R
Adj flow				1234	0	537		1389	705		1977	495
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L	LTR	R		T	R		T	R	
So			1900	1900	1900		1900	1900		1900	1900	
Lanes	0	0	1	1	1	0	4	1	0	4	1	
fW			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fHV			0.980	0.980	0.980		0.980	0.980		0.980	0.980	
fG			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fP			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fBB			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fA			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fLU			1.000	1.000	1.000		0.908	1.000		0.908	1.000	
fRT				1.000	0.850		1.000	0.850		1.000	0.850	
fLT			0.950	1.000			1.000			1.000		
Sec.												
fLpb			1.000	1.000			1.000			1.000		
fRpb				1.000	1.000		1.000	1.000		1.000	1.000	
S			1770	1863	1583		6765	1583		6765	1583	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	1234	1770	#	0.70	0.58	1027	1.20
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.58	1081	0.00
Right	R	537	1583		0.34	0.58	918	0.58
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1389	6765		0.21	0.31	2097	0.66
Right	R	705	1583		0.45	1.00	1583	0.45
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1977	6765	#	0.29	0.31	2097	0.94
Right	R	495	1583		0.31	1.00	1583	0.31

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.99
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.11

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.20	0.58	18.9	1.000	1027	0.50	100.2	0.0	119.1	F		
LTR	0.00	0.58	7.9	1.000	1081	0.11	0.0	0.0	7.9	A	86.9	F
R	0.58	0.58	12.0	1.000	918	0.18	1.0	0.0	13.0	B		
Northbound												
T	0.66	0.31	27.0	1.000	2097	0.24	0.8	0.0	27.8	C	18.5	B
R	0.45	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.94	0.31	30.3	1.000	2097	0.46	9.4	0.0	39.7	D	31.8 C
R	0.31	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A	

Intersection delay = 42.8 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	90.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	90.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	90.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	18.9	18.9	0.00	51.8	0.0	119.1
LTR	0.0	0.00	18.9	7.9	0.00	0.0	0.0	7.9
R	0.0	0.00	18.9	12.0	0.00	0.0	0.0	13.0
Northbound								
	0.0						0.0	
T	0.0	0.00	31.1	27.0	0.00	0.0	0.0	27.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	31.1	30.3	0.00	0.0	0.0	39.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 42.8 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	LTR	R	T	R		T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate				1234	0	537	382	705		544	495	
So				1900	1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0	1	1	1	0 4	1	0	4	1	
SL				1770	1863	1583	1862	1583		1862	1583	
LnCapacity				1027	1081	918	577	1583		577	1583	
Flow Ratio				0.7	0.0	0.3	0.2	0.4		0.3	0.3	
v/c Ratio				1.20	0.00	0.58	0.66	0.45		0.94	0.31	
Grn Ratio				0.58	0.58	0.58	0.31	1.00		0.31	1.00	
I Factor					1.000		1.000			1.000		
AT or PVG				3	3	3	3	3		3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
PF2				1.00	1.00	1.00	1.00			1.00		
Q1				30.9	0.0	8.5	8.3			13.3		
kB				0.7	0.7	0.7	0.5	0.9		0.5	0.9	
Q2				29.5	0.0	0.9	0.9	0.7		4.1	0.4	
Q Average				60.4	0.0	9.4	9.2			17.4		
Q Spacing				25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage				0	0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.1	1.2	1.2	1.2			1.2		
BOQ				67.8	0.0	11.1	10.9			20.2		
QSRatio												
85th Percentile Output:												
fB%				1.3	1.6	1.5	1.5			1.5		
BOQ				80.9	0.0	14.3	14.0			25.5		
QSRatio												
90th Percentile Output:												
fB%				1.4	1.8	1.6	1.7			1.6		
BOQ				85.7	0.0	15.6	15.2			27.2		
QSRatio												
95th Percentile Output:												
fB%				1.5	2.1	1.9	1.9			1.7		
BOQ				91.8	0.0	17.5	17.2			30.0		
QSRatio												
98th Percentile Output:												
fB%				1.7	2.7	2.2	2.2			2.0		
BOQ				103	0.0	20.6	20.2			34.1		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 NB Ramps

Inter.: Jamboree at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Volume				677	0	752		2598	1142		1671	501
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	33.7	0.0				12.7	13.4	0.0
Yellow	3.6					4.3	4.3	
All Red	1.0					1.0	1.0	

Cycle Length: 75.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	795	1770	0.90	0.45	32.0	C		
LTR	837	1863	0.00	0.45	11.4	B	62.6	E
R	711	1583	1.11	0.45	90.2	F		
Northbound								
T	2832	6765	0.97	0.42	31.5	C	22.5	C
R	1583	1583	0.76	1.00	2.2	A		
Southbound								
T	2832	6765	0.62	0.42	17.6	B	13.5	B
R	1583	1583	0.33	1.00	0.1	A		

Intersection Delay = 27.7 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Jamboree at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				677	0	752		2598	1142		1671	501
% Heavy Veh				2	2	2		2	2		2	2
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
PK 15 Vol				178	0	198		684	301		440	132
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0		12.0	12.0
RTOR Vol						0				0			0
Adj Flow				713	0	792		2735	1202		1759	527
%InSharedLn				0		0							
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0		0.0	0.0
Arriv. Type				3	3	3		3	3		3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		33.7	0.0			12.7	13.4	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 75.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				677	0	752		2598	1142		1671	501
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
Adj flow				713	0	792		2735	1202		1759	527
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
Lane group				L		LTR	R		T	R		T	R
Adj flow				713	0	792		2735	1202		1759	527
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L	LTR	R		T	R		T	R	
So			1900	1900	1900		1900	1900		1900	1900	
Lanes	0	0	1	1	1	0	4	1	0	4	1	
fW			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fHV			0.980	0.980	0.980		0.980	0.980		0.980	0.980	
fG			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fP			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fBB			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fA			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fLU			1.000	1.000	1.000		0.908	1.000		0.908	1.000	
fRT				1.000	0.850		1.000	0.850		1.000	0.850	
fLT			0.950	1.000			1.000			1.000		
Sec.												
fLpb			1.000	1.000			1.000			1.000		
fRpb				1.000	1.000		1.000	1.000		1.000	1.000	
S			1770	1863	1583		6765	1583		6765	1583	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	713	1770		0.40	0.45	795	0.90
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.45	837	0.00
Right	R	792	1583	#	0.50	0.45	711	1.11
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2735	6765	#	0.40	0.42	2832	0.97
Right	R	1202	1583		0.76	1.00	1583	0.76
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1759	6765		0.26	0.42	2832	0.62
Right	R	527	1583		0.33	1.00	1583	0.33

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.90
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.04

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.90	0.45	19.0	1.000	795	0.42	12.9	0.0	32.0	C		
LTR	0.00	0.45	11.4	1.000	837	0.11	0.0	0.0	11.4	B	62.6	E
R	1.11	0.45	20.6	1.000	711	0.50	69.5	0.0	90.2	F		
Northbound												
T	0.97	0.42	21.3	1.000	2832	0.47	10.2	0.0	31.5	C	22.5	C
R	0.76	1.00	0.0	0.950	1583	0.31	2.2	0.0	2.2	A		
Southbound												

T	0.62	0.42	17.1	1.000	2832	0.20	0.4	0.0	17.6	B	13.5	B
R	0.33	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 27.7 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	75.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	75.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	75.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	20.6	19.0	0.00	0.0	0.0	32.0
LTR	0.0	0.00	20.6	11.4	0.00	0.0	0.0	11.4
R	0.0	0.00	20.6	20.6	0.00	20.2	0.0	90.2
Northbound								
	0.0						0.0	
T	0.0	0.00	21.8	21.3	0.00	0.0	0.0	31.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.2
Southbound								
	0.0						0.0	
T	0.0	0.00	21.8	17.1	0.00	0.0	0.0	17.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 27.7 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	LTR	R	T	R		T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate				713	0	792	753	1202		484	527	
So				1900	1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0	1	1	1	4	1	0	4	1	
SL				1770	1863	1583	1862	1583		1862	1583	
LnCapacity				795	837	711	779	1583		779	1583	
Flow Ratio				0.4	0.0	0.5	0.4	0.8		0.3	0.3	
v/c Ratio				0.90	0.00	1.11	0.97	0.76		0.62	0.33	
Grn Ratio				0.45	0.45	0.45	0.42	1.00		0.42	1.00	
I Factor					1.000		1.000			1.000		
AT or PVG				3	3	3	3	3		3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
PF2				1.00	1.00	1.00	1.00			1.00		
Q1				13.7	0.0	16.5	15.3			7.9		
kB				0.5	0.6	0.5	0.5	0.8		0.5	0.8	
Q2				3.5	0.0	13.8	5.6	2.4		0.9	0.4	
Q Average				17.2	0.0	30.3	21.0			8.8		
Q Spacing				25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage				0	0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.2	1.2	1.1	1.2			1.2		
BOQ				20.0	0.0	34.7	24.3			10.4		
QSRatio												
85th Percentile Output:												
fB%				1.5	1.6	1.4	1.4			1.5		
BOQ				25.3	0.0	42.6	30.4			13.4		
QSRatio												
90th Percentile Output:												
fB%				1.6	1.8	1.5	1.5			1.7		
BOQ				27.0	0.0	45.0	32.3			14.6		
QSRatio												
95th Percentile Output:												
fB%				1.7	2.1	1.6	1.7			1.9		
BOQ				29.8	0.0	48.8	35.4			16.4		
QSRatio												
98th Percentile Output:												
fB%				2.0	2.7	1.8	1.9			2.2		
BOQ				33.8	0.0	54.4	39.8			19.4		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study--Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Volume	457		972					1531	430		2286	604
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	24.4	0.0				7.8	12.6	0.0
Yellow	3.6					4.3	4.3	
All Red	1.0					1.0	1.0	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1398	3437	0.34	0.41	12.4	B		
							21.8	C
R	1140	2803	0.90	0.41	26.2	C		
Westbound								
Northbound								
T	2898	6765	0.56	0.43	13.1	B	10.3	B
R	1583	1583	0.29	1.00	0.1	A		
Southbound								
T	2898	6765	0.83	0.43	17.4	B	13.8	B
R	1583	1583	0.40	1.00	0.2	A		

Intersection Delay = 14.5 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study--Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	457	972					1531	430		2286	604	
% Heavy Veh	2	2					2	2		2	2	
PHF	0.95	0.95					0.95	0.95		0.95	0.95	
PK 15 Vol	120	256					403	113		602	159	
Hi Ln Vol												
% Grade	0						0			0		
Ideal Sat	1900	1900					1900	1900		1900	1900	
ParkExist												
NumPark												
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0	12.0					12.0	12.0		12.0	12.0	
RTOR Vol		0						0			0	
Adj Flow	481	1023					1612	453		2406	636	
%InSharedLn												
Prop LTs							0.000			0.000		
Prop RTs		1.000					0.000	1.000		0.000	1.000	
Peds Bikes	0			0			0			0		
Buses	0	0					0	0		0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0					0.0	0.0		0.0	0.0	
Arriv. Type	3	3					3	3		3	3	
Unit Ext.	3.0	3.0					3.0	3.0		3.0	3.0	
I Factor		1.000					1.000			1.000		
Lost Time	2.0	2.0					2.0	2.0		2.0	2.0	
Ext of g	2.0	2.0					2.0	2.0		2.0	2.0	
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		24.4	0.0			7.8	12.6	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	457	972					1531	430		2286	604	
PHF	0.95	0.95					0.95	0.95		0.95	0.95	
Adj flow	481	1023					1612	453		2406	636	
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
Lane group	L		R					T	R		T	R
Adj flow	481	1023					1612	453		2406	636	
Prop LTs							0.000			0.000		
Prop RTs		1.000					0.000	1.000		0.000	1.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound					Westbound					Northbound			Southbound	
LG	L		R								T	R		T	R
So	1900		1900								1900	1900		1900	1900
Lanes	2	0	2	0	0	0	0				4	1	0	4	1
fW	1.000		1.000								1.000	1.000		1.000	1.000
fHV	0.980		0.980								0.980	0.980		0.980	0.980
fG	1.000		1.000								1.000	1.000		1.000	1.000
fP	1.000		1.000								1.000	1.000		1.000	1.000
fBB	1.000		1.000								1.000	1.000		1.000	1.000
fA	1.000		1.000								1.000	1.000		1.000	1.000
fLU	0.971		0.885								0.908	1.000		0.908	1.000
fRT			0.850								1.000	0.850		1.000	0.850
fLT	0.950										1.000			1.000	
Sec.															
fLpb	1.000										1.000			1.000	
fRpb			1.000								1.000	1.000		1.000	1.000
S	3437		2803								6765	1583		6765	1583
Sec.															

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	481	3437		0.14	0.41	1398	0.34
Prot								
Perm								
Thru								
Right	R	1023	2803	#	0.36	0.41	1140	0.90
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1612	6765		0.24	0.43	2898	0.56
Right	R	453	1583		0.29	1.00	1583	0.29
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2406	6765	#	0.36	0.43	2898	0.83
Right	R	636	1583		0.40	1.00	1583	0.40

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.72
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.86

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.34	0.41	12.3	1.000	1398	0.11	0.1	0.0	12.4	B		
											21.8	C
R	0.90	0.41	16.6	1.000	1140	0.42	9.6	0.0	26.2	C		
Westbound												
Northbound												
T	0.56	0.43	12.9	1.000	2898	0.15	0.2	0.0	13.1	B	10.3	B
R	0.29	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.83	0.43	15.2	1.000	2898	0.37	2.2	0.0	17.4	B	13.8	B
R	0.40	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 14.5 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	17.8	12.3	0.00	0.0	0.0	12.4

	0.0						0.0	
R	0.0	0.00	17.8	16.6	0.00	0.0	0.0	26.2
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	17.1	12.9	0.00	0.0	0.0	13.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	17.1	15.2	0.00	0.0	0.0	17.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 14.5 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	247	577			443	453	662	636
So	1900	1900			1900	1900	1900	1900
No.Lanes	2 0 2		0 0 0		0 4	1	0 4	1
SL	1770	1584			1862	1583	1862	1583
LnCapacity	719	644			797	1583	797	1583
Flow Ratio	0.1	0.4			0.2	0.3	0.4	0.4
v/c Ratio	0.34	0.90			0.56	0.29	0.83	0.40
Grn Ratio	0.41	0.41			0.43	1.00	0.43	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	2.8	9.0			5.5		9.8	
kB	0.4	0.4			0.5	0.7	0.5	0.7
Q2	0.2	2.7			0.6	0.3	2.1	0.5
Q Average	3.1	11.7			6.1		11.9	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	3.7	13.7			7.3		13.9	
QSRatio								
85th Percentile Output:								
fB%	1.6	1.5			1.5		1.5	
BOQ	4.8	17.6			9.5		17.8	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.6			1.7		1.6	
BOQ	5.4	19.0			10.4		19.2	
QSRatio								
95th Percentile Output:								
fB%	2.0	1.8			1.9		1.8	
BOQ	6.2	21.2			11.8		21.5	
QSRatio								
98th Percentile Output:								
fB%	2.5	2.1			2.3		2.1	
BOQ	7.6	24.6			14.2		24.9	
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Volume	677		752					2598	1142		1671	501
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	19.3	0.0				10.1	15.4	0.0
Yellow	3.6					4.3	4.3	
All Red	1.0					1.0	1.0	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1106	3437	0.64	0.32	18.7	B		
							24.2	C
R	902	2803	0.88	0.32	29.1	C		
Westbound								
Northbound								
T	3473	6765	0.79	0.51	13.2	B	9.8	A
R	1583	1583	0.76	1.00	2.2	A		
Southbound								
T	3473	6765	0.51	0.51	9.7	A	7.5	A
R	1583	1583	0.33	1.00	0.1	A		

Intersection Delay = 11.9 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Jamboree at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	677	752					2598	1142		1671	501	
% Heavy Veh	2	2					2	2		2	2	
PHF	0.95	0.95					0.95	0.95		0.95	0.95	
PK 15 Vol	178	198					684	301		440	132	
Hi Ln Vol												
% Grade	0						0			0		
Ideal Sat	1900	1900					1900	1900		1900	1900	
ParkExist												
NumPark												
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0	12.0					12.0	12.0		12.0	12.0	
RTOR Vol		0						0			0	
Adj Flow	713	792					2735	1202		1759	527	
%InSharedLn												
Prop LTs							0.000			0.000		
Prop RTs		1.000					0.000	1.000		0.000	1.000	
Peds Bikes	0			0			0			0		
Buses	0	0					0	0		0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0					0.0	0.0		0.0	0.0	
Arriv. Type	3	3					3	3		3	3	
Unit Ext.	3.0	3.0					3.0	3.0		3.0	3.0	
I Factor		1.000					1.000			1.000		
Lost Time	2.0	2.0					2.0	2.0		2.0	2.0	
Ext of g	2.0	2.0					2.0	2.0		2.0	2.0	
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	19.3	0.0			10.1	15.4	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	677	752					2598	1142		1671	501	
PHF	0.95	0.95					0.95	0.95		0.95	0.95	
Adj flow	713	792					2735	1202		1759	527	
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
Lane group	L		R					T	R		T	R
Adj flow	713	792					2735	1202		1759	527	
Prop LTs							0.000			0.000		
Prop RTs		1.000					0.000	1.000		0.000	1.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound					Westbound					Northbound			Southbound	
LG	L		R								T	R		T	R
So	1900		1900								1900	1900		1900	1900
Lanes	2	0	2	0	0	0	0				4	1	0	4	1
fW	1.000		1.000								1.000	1.000		1.000	1.000
fHV	0.980		0.980								0.980	0.980		0.980	0.980
fG	1.000		1.000								1.000	1.000		1.000	1.000
fP	1.000		1.000								1.000	1.000		1.000	1.000
fBB	1.000		1.000								1.000	1.000		1.000	1.000
fA	1.000		1.000								1.000	1.000		1.000	1.000
fLU	0.971		0.885								0.908	1.000		0.908	1.000
fRT			0.850								1.000	0.850		1.000	0.850
fLT	0.950										1.000			1.000	
Sec.															
fLpb	1.000										1.000			1.000	
fRpb			1.000								1.000	1.000		1.000	1.000
S	3437		2803								6765	1583		6765	1583
Sec.															

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left	L	713	3437	0.21	0.32	1106	0.64
Prot							
Perm							
Thru							
Right	R	792	2803	0.28	0.32	902	0.88
Westbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	2735	6765	0.40	0.51	3473	0.79
Right	R	1202	1583	# 0.76	1.00	1583	0.76
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1759	6765	0.26	0.51	3473	0.51
Right	R	527	1583	0.33	1.00	1583	0.33

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.76
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.76

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.64	0.32	17.4	1.000	1106	0.22	1.3	0.0	18.7	B		
											24.2	C
R	0.88	0.32	19.2	1.000	902	0.40	9.9	0.0	29.1	C		
Westbound												
Northbound												
T	0.79	0.51	11.9	1.000	3473	0.33	1.3	0.0	13.2	B	9.8	A
R	0.76	1.00	0.0	0.950	1583	0.31	2.2	0.0	2.2	A		
Southbound												

T	0.51	0.51	9.6	1.000	3473	0.12	0.1	0.0	9.7	A	7.5	A
R	0.33	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 11.9 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	20.3	17.4	0.00	0.0	0.0	18.7

	0.0						0.0	
R	0.0	0.00	20.3	19.2	0.00	0.0	0.0	29.1
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	14.6	11.9	0.00	0.0	0.0	13.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.2
Southbound								
	0.0						0.0	
T	0.0	0.00	14.6	9.6	0.00	0.0	0.0	9.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 11.9 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	367	447			753	1202	484	527
So	1900	1900			1900	1900	1900	1900
No.Lanes	2 0 2		0 0 0		0 4	1	0 4	1
SL	1770	1584			1862	1583	1862	1583
LnCapacity	569	509			956	1583	956	1583
Flow Ratio	0.2	0.3			0.4	0.8	0.3	0.3
v/c Ratio	0.64	0.88			0.79	0.76	0.51	0.33
Grn Ratio	0.32	0.32			0.51	1.00	0.51	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	5.2	7.0			10.3		5.3	
kB	0.4	0.4			0.5	0.7	0.5	0.7
Q2	0.7	2.1			1.8	2.2	0.5	0.4
Q Average	5.9	9.1			12.1		5.8	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	7.0	10.7			14.2		6.9	
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5			1.5		1.5	
BOQ	9.2	13.8			18.1		9.0	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.7			1.6		1.7	
BOQ	10.0	15.0			19.5		9.9	
QSRatio								
95th Percentile Output:								
fB%	1.9	1.9			1.8		1.9	
BOQ	11.4	16.9			21.8		11.3	
QSRatio								
98th Percentile Output:								
fB%	2.3	2.2			2.1		2.3	
BOQ	13.8	20.0			25.3		13.7	
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 NB Ramps

Inter.: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L		T			T R
Volume	147	0	432				328	913			2478	42
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right	A				WB Right				
Green	27.5	0.0				12.8	37.9	20.9	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	406	1770	0.38	0.23	39.7	D		
LTR	427	1863	0.00	0.23	35.7	D	145.1	F
R	363	1583	1.25	0.23	181.0	F		
Westbound								
Northbound								
L	367	3437	0.94	0.11	85.1	F		
T	3450	5074	0.28	0.68	7.6	A	28.1	C
Southbound								
T	2732	5074	0.95	0.54	35.3	D	34.7	C
R	1583	1583	0.03	1.00	0.0+	A		

Intersection Delay = 47.5 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Tustin Ranch at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 NB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	147	0	432				328	913			2478	42
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	39	0	114				86	240			652	11
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	155	0	455				345	961			2608	44
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A							
EB Thru	A							
EB Right	A							
EB Peds								
WB Left								
WB Thru								
WB Right								
WB Peds								
NB Left					A			
NB Thru					A	A	A	
NB Right								
NB Peds								
SB Left								
SB Thru						A	A	
SB Right					A	A	A	
SB Peds								
NB Right								
SB Right	A							
EB Right								
WB Right								
Green	27.5	0.0			12.8	37.9	20.9	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	1.5				1.0	1.5	1.5	

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	147	0	432				328	913			2478	42
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	155	0	455				345	961			2608	44
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	155	0	455				345	961			2608	44
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	155	1770		0.09	0.23	406	0.38
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.23	427	0.00
Right	R	455	1583	#	0.29	0.23	363	1.25
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	345	3437	#	0.10	0.11	367	0.94
Prot								
Perm								
Thru	T	961	5074		0.19	0.68	3450	0.28
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2608	5074	#	0.51	0.54	2732	0.95
Right	R	44	1583		0.03	1.00	1583	0.03

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.90
Total lost time per cycle, L = 15.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.03

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.38	0.23	39.1	1.000	406	0.11	0.6	0.0	39.7	D		
LTR	0.00	0.23	35.7	1.000	427	0.11	0.0	0.0	35.7	D	145.1	F
R	1.25	0.23	46.3	1.000	363	0.50	134.8	0.0	181.0	F		
Westbound												
Northbound												
L	0.94	0.11	53.2	1.000	367	0.45	31.9	0.0	85.1	F		
T	0.28	0.68	7.6	1.000	3450	0.11	0.0	0.0	7.6	A	28.1	C
Southbound												

T	0.95	0.54	26.3	1.000	2732	0.46	9.0	0.0	35.3	D	34.7	C
R	0.03	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		

Intersection delay = 47.5 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	120.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	120.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	120.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	46.3	39.1	0.00	0.0	0.0	39.7

LTR	0.0	0.00	46.3	35.7	0.00	0.0	0.0	35.7
R	0.0	0.00	46.3	46.3	0.00	23.0	0.0	181.0
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	53.6	53.2	0.00	0.0	0.0	85.1
T	0.0	0.00	19.2	7.6	0.00	0.0	0.0	7.6
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	27.7	26.3	0.00	0.0	0.0	35.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+

Intersection Delay 47.5 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	155	0	455				177	352		957	44	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	406	427	363				188	1266		1002	1583	
Flow Ratio	0.1	0.0	0.3				0.1	0.2		0.5	0.0	
v/c Ratio	0.38	0.00	1.25				0.94	0.28		0.96	0.03	
Grn Ratio	0.23	0.23	0.23				0.11	0.68		0.54	1.00	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00		
Q1	4.4	0.0	15.2				5.9	4.6		30.3		
kB	0.5	0.5	0.4				0.3	0.9		0.8	1.1	
Q2	0.3	0.0	13.4				2.0	0.4		7.5	0.0	
Q Average	4.7	0.0	28.6				7.8	5.0		37.8		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.1				1.2	1.2		1.1		
BOQ	5.5	0.0	32.8				9.3	5.9		43.1		
QSRatio												
85th Percentile Output:												
fB%	1.6	1.6	1.4				1.5	1.6		1.4		
BOQ	7.2	0.0	40.4				12.0	7.8		52.4		
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8	1.5				1.7	1.7		1.5		
BOQ	8.0	0.0	42.7				13.1	8.5		55.2		
QSRatio												
95th Percentile Output:												
fB%	2.0	2.1	1.6				1.9	2.0		1.6		
BOQ	9.1	0.0	46.3				14.8	9.8		59.5		
QSRatio												
98th Percentile Output:												
fB%	2.4	2.7	1.8				2.2	2.4		1.8		
BOQ	11.2	0.0	51.7				17.6	11.9		66.3		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 NB Ramps

Inter.: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	318	0	284				661	1572			986	459
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right	A				WB Right			
Green	13.9	0.0				16.0	4.8	4.4	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	410	1770	0.82	0.23	34.0	C		
LTR	432	1863	0.00	0.23	17.7	B	34.5	C
R	367	1583	0.81	0.23	35.1	D		
Westbound								
Northbound								
L	917	3437	0.76	0.27	24.0	C		
T	2977	5074	0.56	0.59	7.8	A	12.6	B
Southbound								
T	1268	5074	0.82	0.25	25.6	C	17.5	B
R	1583	1583	0.31	1.00	0.1	A		

Intersection Delay = 17.3 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 NB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	318	0	284				661	1572			986	459
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	84	0	75				174	414			259	121
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	335	0	299				696	1655			1038	483
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru	A	A	A
Right		A			Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right		A			WB Right			
Green		13.9	0.0			16.0	4.8	4.4	0.0
Yellow		3.6				3.2	4.3	4.3	
All Red		1.5				1.0	1.5	1.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	318	0	284				661	1572			986	459
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	335	0	299				696	1655			1038	483
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	335	0	299				696	1655			1038	483
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	335	1770	#	0.19	0.23	410	0.82
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.23	432	0.00
Right	R	299	1583		0.19	0.23	367	0.81
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	696	3437	#	0.20	0.27	917	0.76
Prot								
Perm								
Thru	T	1655	5074		0.33	0.59	2977	0.56
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1038	5074	#	0.20	0.25	1268	0.82
Right	R	483	1583		0.31	1.00	1583	0.31

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.60
Total lost time per cycle, L = 15.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.80

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.82	0.23	21.8	1.000	410	0.36	12.2	0.0	34.0	C		
LTR	0.00	0.23	17.7	1.000	432	0.11	0.0	0.0	17.7	B	34.5	C
R	0.81	0.23	21.8	1.000	367	0.36	13.2	0.0	35.1	D		
Westbound												
Northbound												
L	0.76	0.27	20.2	1.000	917	0.31	3.7	0.0	24.0	C		
T	0.56	0.59	7.6	1.000	2977	0.15	0.2	0.0	7.8	A	12.6	B
Southbound												

T	0.82	0.25	21.2	1.000	1268	0.36	4.4	0.0	25.6	C	17.5	B
R	0.31	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 17.3 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	23.1	21.8	0.00	0.0	0.0	34.0

LTR	0.0	0.00	23.1	17.7	0.00	0.0	0.0	17.7
R	0.0	0.00	23.1	21.8	0.00	0.0	0.0	35.1
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	22.0	20.2	0.00	0.0	0.0	24.0
T	0.0	0.00	12.4	7.6	0.00	0.0	0.0	7.8
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	22.5	21.2	0.00	0.0	0.0	25.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 17.3 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	335	0	299				358	607		381	483	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	410	432	367				472	1092		465	1583	
Flow Ratio	0.2	0.0	0.2				0.2	0.3		0.2	0.3	
v/c Ratio	0.82	0.00	0.81				0.76	0.56		0.82	0.31	
Grn Ratio	0.23	0.23	0.23				0.27	0.59		0.25	1.00	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00		
Q1	5.3	0.0	4.7				5.5	6.2		6.0		
kB	0.3	0.3	0.3				0.3	0.6		0.3	0.7	
Q2	1.2	0.0	1.1				1.0	0.7		1.4	0.3	
Q Average	6.5	0.0	5.9				6.5	6.9		7.4		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.2		
BOQ	7.7	0.0	7.0				7.7	8.2		8.7		
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6	1.5				1.5	1.5		1.5		
BOQ	10.1	0.0	9.1				10.0	10.6		11.3		
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8	1.7				1.7	1.7		1.7		
BOQ	11.0	0.0	10.0				11.0	11.6		12.3		
QSRatio												
95th Percentile Output:												
fB%	1.9	2.1	1.9				1.9	1.9		1.9		
BOQ	12.5	0.0	11.3				12.5	13.2		14.0		
QSRatio												
98th Percentile Output:												
fB%	2.3	2.7	2.3				2.3	2.3		2.3		
BOQ	15.1	0.0	13.7				15.0	15.8		16.7		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L		T			T R
Volume	713	0	845				166	941			2334	590
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	51.6	0.0				5.5	47.2	10.3 0.0
Yellow	3.6					3.2	4.3	4.3
All Red	0.5					0.5	0.5	0.5

Cycle Length: 132.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	692	1770	1.09	0.39	99.9	F		
LTR	728	1863	0.00	0.39	24.5	C	178.9	F
R	619	1583	1.44	0.39	245.6	F		
Westbound								
Northbound								
L	143	3437	1.22	0.04	210.9	F		
T	2748	5074	0.36	0.54	17.3	B	46.4	D
Southbound								
T	2395	5074	1.03	0.47	60.2	E	55.8	E
R	747	1583	0.83	0.47	38.2	D		

Intersection Delay = 88.2 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Tustin Ranch at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	713	0	845				166	941			2334	590
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	188	0	222				44	248			614	155
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	751	0	889				175	991			2457	621
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	51.6	0.0				5.5	47.2	10.3	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 132.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	713	0	845				166	941			2334	590
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	751	0	889				175	991			2457	621
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	751	0	889				175	991			2457	621
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound						Westbound						Northbound						Southbound					
LG	L		LTR	R									L		T				T		R			
So	1900		1900	1900									1900		1900				1900		1900			
Lanes	1		1		0		0		0				2		3		0		0		3		1	
fW	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fHV	0.980		0.980	0.980									0.980		0.980						0.980		0.980	
fG	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fP	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fBB	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fA	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fLU	1.000		1.000	1.000									0.971		0.908						0.908		1.000	
fRT			1.000	0.850											1.000						1.000		0.850	
fLT	0.950		1.000										0.950		1.000						1.000			
Sec.																								
fLpb	1.000		1.000										1.000		1.000						1.000			
fRpb			1.000	1.000											1.000						1.000		1.000	
S	1770		1863	1583									3437		5074						5074		1583	
Sec.																								

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	751	1770		0.42	0.39	692	1.09
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.39	728	0.00
Right	R	889	1583	#	0.56	0.39	619	1.44
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	175	3437	#	0.05	0.04	143	1.22
Prot								
Perm								
Thru	T	991	5074		0.20	0.54	2748	0.36
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2457	5074	#	0.48	0.47	2395	1.03
Right	R	621	1583		0.39	0.47	747	0.83

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.10
Total lost time per cycle, L = 12.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.21

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.09	0.39	40.2	1.000	692	0.50	59.7	0.0	99.9	F		
LTR	0.00	0.39	24.5	1.000	728	0.11	0.0	0.0	24.5	C	178.9	F
R	1.44	0.39	40.2	1.000	619	0.50	205.4	0.0	245.6	F		
Westbound												
Northbound												
L	1.22	0.04	63.3	1.000	143	0.50	147.6	0.0	210.9	F		
T	0.36	0.54	17.2	1.000	2748	0.11	0.1	0.0	17.3	B	46.4	D
Southbound												

T	1.03	0.47	34.8	1.000	2395	0.50	25.3	0.0	60.2	E	55.8 E
R	0.83	0.47	30.3	1.000	747	0.37	7.9	0.0	38.2	D	

Intersection delay = 88.2 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 132.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 132.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	132.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	40.2	40.2	0.00	14.8	0.0	99.9

LTR	0.0	0.00	40.2	24.5	0.00	0.0	0.0	24.5
R	0.0	0.00	40.2	40.2	0.00	67.5	0.0	245.6
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	63.3	63.3	0.00	8.0	0.0	210.9
T	0.0	0.00	30.2	17.2	0.00	0.0	0.0	17.3
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	34.8	34.8	0.00	15.5	0.0	60.2
R	0.0	0.00	34.8	30.3	0.00	0.0	0.0	38.2

Intersection Delay 88.2 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	751	0	889				90	363		901	621	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	0 3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	692	728	619				73	1008		879	747	
Flow Ratio	0.4	0.0	0.6				0.1	0.2		0.5	0.4	
v/c Ratio	1.09	0.00	1.44				1.23	0.36		1.03	0.83	
Grn Ratio	0.39	0.39	0.39				0.04	0.54		0.47	0.47	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
Q1	27.5	0.0	32.6				3.3	7.6		33.0	19.8	
kB	0.7	0.7	0.7				0.2	0.9		0.8	0.7	
Q2	12.6	0.0	35.8				2.8	0.5		11.0	3.0	
Q Average	40.1	0.0	68.4				6.1	8.1		44.0	22.8	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.1				1.2	1.2		1.1	1.2	
BOQ	45.6	0.0	76.4				7.3	9.5		49.9	26.4	
QSRatio												
85th Percentile Output:												
fB%	1.4	1.6	1.3				1.5	1.5		1.4	1.4	
BOQ	55.3	0.0	91.0				9.5	12.3		60.3	32.8	
QSRatio												
90th Percentile Output:												
fB%	1.5	1.8	1.4				1.7	1.7		1.4	1.5	
BOQ	58.3	0.0	96.6				10.4	13.4		63.6	34.8	
QSRatio												
95th Percentile Output:												
fB%	1.6	2.1	1.5				1.9	1.9		1.6	1.7	
BOQ	62.8	0.0	103				11.8	15.2		68.3	38.1	
QSRatio												
98th Percentile Output:												
fB%	1.7	2.7	1.7				2.3	2.2		1.7	1.9	
BOQ	70.0	0.0	117				14.3	18.1		76.3	42.7	
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L		T		T	R
Volume	589	0	492				248	1784			947	330
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	22.4	0.0				5.7	5.9	5.6	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 57.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	696	1770	0.89	0.39	29.8	C		
LTR	732	1863	0.00	0.39	10.5	B	27.7	C
R	622	1583	0.83	0.39	25.1	C		
Westbound								
Northbound								
L	344	3437	0.76	0.10	34.4	C		
T	2288	5074	0.82	0.45	16.2	B	18.4	B
Southbound								
T	1451	5074	0.69	0.29	19.5	B	21.2	C
R	453	1583	0.77	0.29	26.3	C		

Intersection Delay = 21.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Tustin Ranch at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	589	0	492				248	1784			947	330
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	155	0	129				65	469			249	87
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	620	0	518				261	1878			997	347
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru	A	A	A
Right		A			Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		22.4	0.0			5.7	5.9	5.6	0.0
Yellow		3.6				3.2	4.3	4.3	
All Red		0.5				0.5	0.5	0.5	

Cycle Length: 57.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	589	0	492				248	1784			947	330
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	620	0	518				261	1878			997	347
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	620	0	518				261	1878			997	347
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	620	1770	#	0.35	0.39	696	0.89
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.39	732	0.00
Right	R	518	1583		0.33	0.39	622	0.83
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	261	3437		0.08	0.10	344	0.76
Prot								
Perm								
Thru	T	1878	5074	#	0.37	0.45	2288	0.82
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	997	5074		0.20	0.29	1451	0.69
Right	R	347	1583		0.22	0.29	453	0.77

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.72
Total lost time per cycle, L = 8.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.85

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.89	0.39	16.2	1.000	696	0.41	13.7	0.0	29.8	C		
LTR	0.00	0.39	10.5	1.000	732	0.11	0.0	0.0	10.5	B	27.7	C
R	0.83	0.39	15.6	1.000	622	0.37	9.5	0.0	25.1	C		
Westbound												
Northbound												
L	0.76	0.10	25.0	1.000	344	0.31	9.4	0.0	34.4	C		
T	0.82	0.45	13.6	1.000	2288	0.36	2.5	0.0	16.2	B	18.4	B
Southbound												

T	0.69	0.29	18.1	1.000	1451	0.26	1.4	0.0	19.5	B	21.2	C
R	0.77	0.29	18.6	1.000	453	0.32	7.7	0.0	26.3	C		

Intersection delay = 21.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 57.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 57.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	57.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	17.3	16.2	0.00	0.0	0.0	29.8

LTR	0.0	0.00	17.3	10.5	0.00	0.0	0.0	10.5
R	0.0	0.00	17.3	15.6	0.00	0.0	0.0	25.1
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	25.6	25.0	0.00	0.0	0.0	34.4
T	0.0	0.00	15.6	13.6	0.00	0.0	0.0	16.2
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	20.3	18.1	0.00	0.0	0.0	19.5
R	0.0	0.00	20.3	18.6	0.00	0.0	0.0	26.3

Intersection Delay 21.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	620	0	518				134	689		366	347	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	0 3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	696	732	622				177	839		532	453	
Flow Ratio	0.4	0.0	0.3				0.1	0.4		0.2	0.2	
v/c Ratio	0.89	0.00	0.83				0.76	0.82		0.69	0.77	
Grn Ratio	0.39	0.39	0.39				0.10	0.45		0.29	0.29	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
Q1	9.2	0.0	7.4				2.1	9.5		5.2	5.0	
kB	0.4	0.4	0.4				0.2	0.5		0.4	0.3	
Q2	2.7	0.0	1.7				0.5	2.0		0.8	1.0	
Q Average	11.9	0.0	9.1				2.6	11.5		5.9	6.0	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.2	1.2	
BOQ	13.9	0.0	10.8				3.1	13.5		7.0	7.1	
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6	1.5				1.6	1.5		1.5	1.5	
BOQ	17.8	0.0	13.9				4.1	17.3		9.1	9.3	
QSRatio												
90th Percentile Output:												
fB%	1.6	1.8	1.7				1.8	1.6		1.7	1.7	
BOQ	19.2	0.0	15.1				4.5	18.7		10.0	10.2	
QSRatio												
95th Percentile Output:												
fB%	1.8	2.1	1.9				2.0	1.8		1.9	1.9	
BOQ	21.5	0.0	17.0				5.2	20.9		11.4	11.6	
QSRatio												
98th Percentile Output:												
fB%	2.1	2.7	2.2				2.5	2.1		2.3	2.3	
BOQ	24.9	0.0	20.1				6.5	24.3		13.8	14.0	
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 NB Ramps

Inter.: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
LGConfig				L		LT	R	L	T		T	R
Volume				499	3	358	480	820			1300	601
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.3	0.0				14.8	8.4	9.9 0.0
Yellow	3.2					3.2	3.6	3.6
All Red	0.5					0.5	0.5	0.5

Cycle Length: 70.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
Westbound								
L	539	1770	0.97	0.30	56.2	E		
LT	567	1863	0.01	0.30	17.0	B	45.3	D
R	482	1583	0.78	0.30	30.4	C		
Northbound								
L	374	1770	1.35	0.21	202.0	F		
T	2965	5074	0.29	0.58	7.3	A	79.2	E
Southbound								
T	1624	5074	0.84	0.32	26.4	C	65.9	E
R	507	1583	1.25	0.32	151.3	F		

Intersection Delay = 65.8 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Redhill Ave at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 NB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				499	3	358	480	820			1300	601
% Heavy Veh				2	2	2	2	2			2	2
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
PK 15 Vol				131	1	94	126	216			342	158
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900	1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
LGConfig				L		LT	R	L		T			T	R
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0	
Adj Flow				525	3	377	505	863			1368	633
%InSharedLn				0								
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000
Peds Bikes	0				0						0	
Buses				0	0	0	0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Arriv. Type				3	3	3	3	3			3	3
Unit Ext.				3.0	3.0	3.0	3.0	3.0			3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ext of g				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru		A	A
Right		A			Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		21.3	0.0			14.8	8.4	9.9	0.0
Yellow		3.2				3.2	3.6	3.6	
All Red		0.5				0.5	0.5	0.5	

Cycle Length: 70.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				499	3	358	480	820			1300	601
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
Adj flow				525	3	377	505	863			1368	633
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
Lane group				L		LT	R	L		T			T	R
Adj flow				525	3	377	505	863			1368	633
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	LT	R	L	T		T	R	
So				1900	1900	1900	1900	1900		1900	1900	
Lanes	0	0	0	1	1	1	1	3	0	3	1	
fW				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fHV				0.980	0.980	0.980	0.980	0.980		0.980	0.980	
fG				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fP				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fBB				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fA				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fLU				1.000	1.000	1.000	1.000	0.908		0.908	1.000	
fRT					1.000	0.850		1.000		1.000	0.850	
fLT				0.950	1.000		0.950	1.000		1.000		
Sec.												
fLpb				1.000	1.000		1.000	1.000		1.000		
fRpb					1.000	1.000		1.000		1.000	1.000	
S				1770	1863	1583	1770	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	525	1770	#	0.30	0.30	539	0.97
Prot								
Perm								
Thru	LT	3	1863		0.00	0.30	567	0.01
Right	R	377	1583		0.24	0.30	482	0.78
Northbound								
Prot								
Perm								
Left	L	505	1770	#	0.29	0.21	374	1.35
Prot								
Perm								
Thru	T	863	5074		0.17	0.58	2965	0.29
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1368	5074		0.27	0.32	1624	0.84
Right	R	633	1583	#	0.40	0.32	507	1.25

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.98
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.17

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.97	0.30	24.1	1.000	539	0.48	32.1	0.0	56.2	E		
LT	0.01	0.30	17.0	1.000	567	0.11	0.0	0.0	17.0	B	45.3	D
R	0.78	0.30	22.2	1.000	482	0.33	8.2	0.0	30.4	C		
Northbound												
L	1.35	0.21	27.6	1.000	374	0.50	174.4	0.0	202.0	F		
T	0.29	0.58	7.3	1.000	2965	0.11	0.1	0.0	7.3	A	79.2	E
Southbound												

T	0.84	0.32	22.2	1.000	1624	0.38	4.2	0.0	26.4	C	65.9 E
R	1.25	0.32	23.8	1.000	507	0.50	127.5	0.0	151.3	F	

Intersection delay = 65.8 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	70.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	70.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	70.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	24.4	24.1	0.00	0.0	0.0	56.2
LT	0.0	0.00	24.4	17.0	0.00	0.0	0.0	17.0
R	0.0	0.00	24.4	22.2	0.00	0.0	0.0	30.4
Northbound								
L	0.0	0.00	27.6	27.6	0.00	32.8	0.0	202.0
T	0.0	0.00	14.5	7.3	0.00	0.0	0.0	7.3
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	23.8	22.2	0.00	0.0	0.0	26.4
R	0.0	0.00	23.8	23.8	0.00	31.5	0.0	151.3

Intersection Delay 65.8 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	LT	R	L	T		T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate				525	3	377	505	316		502	633	
So				1900	1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0	1	1	1	1	3	0	3	1	
SL				1770	1863	1583	1770	1862		1862	1583	
LnCapacity				539	567	482	374	1088		596	507	
Flow Ratio				0.3	0.0	0.2	0.3	0.2		0.3	0.4	
v/c Ratio				0.97	0.01	0.78	1.35	0.29		0.84	1.25	
Grn Ratio				0.30	0.30	0.30	0.21	0.58		0.32	0.32	
I Factor					1.000			1.000		1.000		
AT or PVG				3	3	3	3	3		3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Q1				10.1	0.0	6.7	9.8	3.1		9.1	12.3	
kB				0.4	0.4	0.4	0.3	0.6		0.4	0.4	
Q2				4.4	0.0	1.3	17.6	0.3		2.0	17.5	
Q Average				14.5	0.0	7.9	27.4	3.3		11.1	29.8	
Q Spacing				25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage				0	0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.2	1.2	1.2	1.2	1.2		1.2	1.1	
BOQ				16.9	0.1	9.4	31.5	4.0		13.0	34.2	
QSRatio												
85th Percentile Output:												
fB%				1.5	1.6	1.5	1.4	1.6		1.5	1.4	
BOQ				21.5	0.1	12.2	38.9	5.2		16.7	42.1	
QSRatio												
90th Percentile Output:												
fB%				1.6	1.8	1.7	1.5	1.7		1.6	1.5	
BOQ				23.1	0.1	13.3	41.1	5.8		18.0	44.5	
QSRatio												
95th Percentile Output:												
fB%				1.8	2.1	1.9	1.6	2.0		1.8	1.6	
BOQ				25.6	0.1	15.0	44.7	6.7		20.2	48.2	
QSRatio												
98th Percentile Output:												
fB%				2.0	2.7	2.2	1.8	2.5		2.1	1.8	
BOQ				29.4	0.1	17.8	49.9	8.2		23.5	53.7	
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 NB Ramps

Inter.: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
LGConfig				L		LT	R	L	T		T	R
Volume				387	47	496	456	1044			731	309
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	34.1	0.0				27.7	10.0	7.7 0.0
Yellow	3.2					3.2	3.6	3.6
All Red	0.5					0.5	0.5	0.5

Cycle Length: 95.1 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	635	1770	0.64	0.36	27.6	C		
LT	668	1863	0.07	0.36	20.1	C	38.9	D
R	568	1583	0.92	0.36	49.4	D		
Northbound								
L	516	1770	0.93	0.29	56.4	E		
T	2838	5074	0.39	0.56	11.9	B	25.4	C
Southbound								
T	1163	5074	0.66	0.23	34.7	C	42.0	D
R	363	1583	0.90	0.23	59.2	E		

Intersection Delay = 34.0 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Redhill Ave at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 NB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				387	47	496	456	1044			731	309
% Heavy Veh				2	2	2	2	2			2	2
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
PK 15 Vol				102	12	131	120	275			192	81
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900	1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
LGConfig				L		LT	R	L		T			T	R
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0	
Adj Flow				407	49	522	480	1099			769	325
%InSharedLn				0								
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000
Peds Bikes	0				0						0	
Buses				0	0	0	0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Arriv. Type				3	3	3	3	3			3	3
Unit Ext.				3.0	3.0	3.0	3.0	3.0			3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ext of g				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	34.1	0.0				27.7	10.0	7.7	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 95.1 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				387	47	496	456	1044			731	309
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
Adj flow				407	49	522	480	1099			769	325
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
Lane group				L		LT	R	L		T			T	R
Adj flow				407	49	522	480	1099			769	325
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	LT	R	L	T		T	R	
So				1900	1900	1900	1900	1900		1900	1900	
Lanes	0	0	0	1	1	1	1	3	0	3	1	
fW				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fHV				0.980	0.980	0.980	0.980	0.980		0.980	0.980	
fG				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fP				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fBB				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fA				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fLU				1.000	1.000	1.000	1.000	0.908		0.908	1.000	
fRT					1.000	0.850		1.000		1.000	0.850	
fLT				0.950	1.000		0.950	1.000		1.000		
Sec.												
fLpb				1.000	1.000		1.000	1.000		1.000		
fRpb					1.000	1.000		1.000		1.000	1.000	
S				1770	1863	1583	1770	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	407	1770		0.23	0.36	635	0.64
Prot								
Perm								
Thru	LT	49	1863		0.03	0.36	668	0.07
Right	R	522	1583	#	0.33	0.36	568	0.92
Northbound								
Prot								
Perm								
Left	L	480	1770	#	0.27	0.29	516	0.93
Prot								
Perm								
Thru	T	1099	5074		0.22	0.56	2838	0.39
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	769	5074		0.15	0.23	1163	0.66
Right	R	325	1583	#	0.21	0.23	363	0.90

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.81
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.92

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.64	0.36	25.4	1.000	635	0.22	2.2	0.0	27.6	C		
LT	0.07	0.36	20.1	1.000	668	0.11	0.0	0.0	20.1	C	38.9	D
R	0.92	0.36	29.2	1.000	568	0.44	20.2	0.0	49.4	D		
Northbound												
L	0.93	0.29	32.8	1.000	516	0.45	23.6	0.0	56.4	E		
T	0.39	0.56	11.8	1.000	2838	0.11	0.1	0.0	11.9	B	25.4	C
Southbound												

T	0.66	0.23	33.3	1.000	1163	0.24	1.4	0.0	34.7	C	42.0	D
R	0.90	0.23	35.5	1.000	363	0.42	23.6	0.0	59.2	E		

Intersection delay = 34.0 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.1 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.1 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.1 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	30.5	25.4	0.00	0.0	0.0	27.6
LT	0.0	0.00	30.5	20.1	0.00	0.0	0.0	20.1
R	0.0	0.00	30.5	29.2	0.00	0.0	0.0	49.4
Northbound								
L	0.0	0.00	33.7	32.8	0.00	0.0	0.0	56.4
T	0.0	0.00	20.9	11.8	0.00	0.0	0.0	11.9
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	36.6	33.3	0.00	0.0	0.0	34.7
R	0.0	0.00	36.6	35.5	0.00	0.0	0.0	59.2

Intersection Delay 34.0 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound				Southbound		
LaneGroup				L	LT	R	L	T			T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0			0.0	0.0	
Flow Rate				407	49	522	480	403			282	325	
So				1900	1900	1900	1900	1900			1900	1900	
No.Lanes	0	0	0	1	1	1	1	3	0	0	3	1	
SL				1770	1863	1583	1770	1862			1862	1583	
LnCapacity				635	668	568	516	1041			426	363	
Flow Ratio				0.2	0.0	0.3	0.3	0.2			0.2	0.2	
v/c Ratio				0.64	0.07	0.92	0.93	0.39			0.66	0.90	
Grn Ratio				0.36	0.36	0.36	0.29	0.56			0.23	0.23	
I Factor					1.000			1.000			1.000		
AT or PVG				3	3	3	3	3			3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00			1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00			1.00	1.00	
Q1				9.0	0.9	13.2	12.3	6.0			6.8	8.3	
kB				0.5	0.6	0.5	0.5	0.7			0.4	0.4	
Q2				0.9	0.0	3.6	3.6	0.5			0.8	2.3	
Q Average				9.9	0.9	16.8	15.9	6.4			7.6	10.6	
Q Spacing				25.0	25.0	25.0	25.0	25.0			25.0	25.0	
Q Storage				0	0	0	0	0			0	0	
Q S Ratio													
70th Percentile Output:													
fB%				1.2	1.2	1.2	1.2	1.2			1.2	1.2	
BOQ				11.7	1.1	19.5	18.5	7.6			9.0	12.4	
QSRatio													
85th Percentile Output:													
fB%				1.5	1.6	1.5	1.5	1.5			1.5	1.5	
BOQ				15.0	1.4	24.7	23.5	9.9			11.6	16.0	
QSRatio													
90th Percentile Output:													
fB%				1.6	1.8	1.6	1.6	1.7			1.7	1.6	
BOQ				16.3	1.6	26.4	25.1	10.9			12.7	17.3	
QSRatio													
95th Percentile Output:													
fB%				1.8	2.1	1.7	1.7	1.9			1.9	1.8	
BOQ				18.3	1.9	29.1	27.8	12.4			14.3	19.4	
QSRatio													
98th Percentile Output:													
fB%				2.2	2.6	2.0	2.0	2.3			2.3	2.1	
BOQ				21.4	2.4	33.1	31.7	14.9			17.1	22.7	
QSRatio													

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
LGConfig		LT	R					T	R	L	T	
Volume	243	0	437					1063	590	471	1257	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A							
Thru	A							
Right	A							
Peds								
WB Left								
Thru								
Right								
Peds								
NB Right								
SB Right								
Green	26.6	0.0			27.1	14.4	21.2	0.0
Yellow	3.2				3.2	3.6	3.6	
All Red	0.5				0.5	0.5	0.5	

NB Left: Thru A A; Right A A; Peds
SB Left A; Thru A A A; Right; Peds
EB Right
WB Right

Cycle Length: 104.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	450	1774	0.57	0.25	35.9	D	96.8	F
R	401	1583	1.15	0.25	130.7	F		
Westbound								
Northbound								
T	2560	6765	0.44	0.38	24.4	C	44.0	D
R	599	1583	1.04	0.38	79.2	E		
Southbound								
L	457	1770	1.09	0.26	106.0	F		
T	4547	6765	0.29	0.67	7.0	A	34.0	C

Intersection Delay = 48.6 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	243	0	437					1063	590	471	1257	
% Heavy Veh	2	2	2					2	2	2	2	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
PK 15 Vol	64	0	115					280	155	124	331	
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat		1900	1900					1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
LGConfig		LT	R					T	R	L	T	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			
Adj Flow		256	460					1119	621	496	1323	
%InSharedLn												
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	
Peds Bikes		0			0			0				
Buses		0	0					0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0					0.0	0.0	0.0	0.0	
Arriv. Type		3	3					3	3	3	3	
Unit Ext.		3.0	3.0					3.0	3.0	3.0	3.0	
I Factor		1.000						1.000			1.000	
Lost Time		2.0	2.0					2.0	2.0	2.0	2.0	
Ext of g		2.0	2.0					2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	26.6	0.0				27.1	14.4	21.2	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 104.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	243	0	437					1063	590	471	1257	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
Adj flow	256	0	460					1119	621	496	1323	
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
Lane group		LT	R					T	R	L	T	
Adj flow		256	460					1119	621	496	1323	
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound			Southbound	
LG	LT	R					T	R	L	T	
So	1900	1900					1900	1900	1900	1900	
Lanes	0 1	0 1	0	0	0	0	4	1	1	4	0
fW	1.000	1.000					1.000	1.000	1.000	1.000	
fHV	0.980	0.980					0.980	0.980	0.980	0.980	
fG	1.000	1.000					1.000	1.000	1.000	1.000	
fP	1.000	1.000					1.000	1.000	1.000	1.000	
fBB	1.000	1.000					1.000	1.000	1.000	1.000	
fA	1.000	1.000					1.000	1.000	1.000	1.000	
fLU	1.000	1.000					0.908	1.000	1.000	0.908	
fRT	1.000	0.850					1.000	0.850		1.000	
fLT	0.952						1.000		0.950	1.000	
Sec.											
fLpb	1.000						1.000		1.000	1.000	
fRpb	1.000	1.000					1.000	1.000		1.000	
S	1774	1583					6765	1583	1770	6765	
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	256	1774		0.14	0.25	450	0.57
Right	R	460	1583	#	0.29	0.25	401	1.15
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1119	6765		0.17	0.38	2560	0.44
Right	R	621	1583	#	0.39	0.38	599	1.04
Southbound								
Prot								
Perm								
Left	L	496	1770	#	0.28	0.26	457	1.09
Prot								
Perm								
Thru	T	1323	6765		0.20	0.67	4547	0.29
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.96
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.08

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
LT	0.57	0.25	34.1	1.000	450	0.16	1.7	0.0	35.9	D	96.8	F
R	1.15	0.25	39.2	1.000	401	0.50	91.5	0.0	130.7	F		
Westbound												
Northbound												
T	0.44	0.38	24.3	1.000	2560	0.11	0.1	0.0	24.4	C	44.0	D
R	1.04	0.38	32.6	1.000	599	0.50	46.6	0.0	79.2	E		
Southbound												
L	1.09	0.26	38.9	1.000	457	0.50	67.1	0.0	106.0	F		

T	0.29	0.67	7.0	1.000	4547	0.11	0.0	0.0	7.0	A	34.0	C

Intersection delay = 48.6 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 104.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 104.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	1.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	104.9 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

LT	0.0	0.00	39.2	34.1	0.00	0.0	0.0	35.9
R	0.0	0.00	39.2	39.2	0.00	14.7	0.0	130.7
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	32.6	24.3	0.00	0.0	0.0	24.4
R	0.0	0.00	32.6	32.6	0.00	5.5	0.0	79.2
Southbound								
L	0.0	0.00	38.9	38.9	0.00	9.8	0.0	106.0
T	0.0	0.00	17.2	7.0	0.00	0.0	0.0	7.0
	0.0						0.0	

Intersection Delay 48.6 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	LT	R					T	R		L	T	
Init Queue	0.0	0.0					0.0	0.0		0.0	0.0	
Flow Rate	256	460					308	621		496	364	
So	1900	1900					1900	1900		1900	1900	
No.Lanes	0 1	1		0	0	0	0 4	1		1	4	0
SL	1774	1583					1862	1583		1770	1862	
LnCapacity	450	401					704	599		457	1251	
Flow Ratio	0.1	0.3					0.2	0.4		0.3	0.2	
v/c Ratio	0.57	1.15					0.44	1.04		1.09	0.29	
Grn Ratio	0.25	0.25					0.38	0.38		0.26	0.67	
I Factor	1.000						1.000				1.000	
AT or PVG	3	3					3	3		3	3	
Pltn Ratio	1.00	1.00					1.00	1.00		1.00	1.00	
PF2	1.00	1.00					1.00	1.00		1.00	1.00	
Q1	6.5	13.4					6.7	18.1		14.5	4.3	
kB	0.5	0.4					0.6	0.6		0.5	0.9	
Q2	0.6	9.9					0.5	8.1		8.4	0.4	
Q Average	7.1	23.3					7.2	26.2		22.8	4.7	
Q Spacing	25.0	25.0					25.0	25.0		25.0	25.0	
Q Storage	0	0					0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2					1.2	1.2		1.2	1.2	
BOQ	8.4	26.9					8.5	30.2		26.4	5.6	
QSRatio												
85th Percentile Output:												
fB%	1.5	1.4					1.5	1.4		1.4	1.6	
BOQ	10.9	33.5					11.0	37.3		32.9	7.3	
QSRatio												
90th Percentile Output:												
fB%	1.7	1.5					1.7	1.5		1.5	1.7	
BOQ	11.9	35.5					12.0	39.5		34.9	8.0	
QSRatio												
95th Percentile Output:												
fB%	1.9	1.7					1.9	1.6		1.7	2.0	
BOQ	13.5	38.8					13.6	42.9		38.1	9.2	
QSRatio												
98th Percentile Output:												
fB%	2.3	1.9					2.3	1.8		1.9	2.4	
BOQ	16.2	43.5					16.3	48.0		42.8	11.2	
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
LGConfig		LT	R					T	R	L	T	
Volume	408	0	332					1092	523	367	738	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.0	0.0				18.0	9.5	15.9	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	466	1774	0.92	0.26	52.3	D	47.7	D
R	416	1583	0.84	0.26	42.0	D		
Westbound								
Northbound								
T	2495	6765	0.46	0.37	19.3	B	28.8	C
R	584	1583	0.94	0.37	48.5	D		
Southbound								
L	398	1770	0.97	0.22	67.8	E		
T	4330	6765	0.18	0.64	5.9	A	26.4	C

Intersection Delay = 32.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Redhill Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	408	0	332					1092	523	367	738	
% Heavy Veh	2	2	2					2	2	2	2	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
PK 15 Vol	107	0	87					287	138	97	194	
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat		1900	1900					1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
LGConfig		LT	R					T	R	L	T	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			
Adj Flow		429	349					1149	551	386	777	
%InSharedLn												
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	
Peds Bikes		0			0			0				
Buses		0	0					0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0					0.0	0.0	0.0	0.0	
Arriv. Type		3	3					3	3	3	3	
Unit Ext.		3.0	3.0					3.0	3.0	3.0	3.0	
I Factor		1.000						1.000			1.000	
Lost Time		2.0	2.0					2.0	2.0	2.0	2.0	
Ext of g		2.0	2.0					2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.0	0.0				18.0	9.5	15.9	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	408	0	332					1092	523	367	738	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
Adj flow	429	0	349					1149	551	386	777	
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
Lane group		LT	R					T	R	L	T	
Adj flow		429	349					1149	551	386	777	
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound			Southbound	
LG	LT	R					T	R	L	T	
So	1900	1900					1900	1900	1900	1900	
Lanes	0 1	0 1	0	0	0	0	4	1	1	4	0
fW	1.000	1.000					1.000	1.000	1.000	1.000	
fHV	0.980	0.980					0.980	0.980	0.980	0.980	
fG	1.000	1.000					1.000	1.000	1.000	1.000	
fP	1.000	1.000					1.000	1.000	1.000	1.000	
fBB	1.000	1.000					1.000	1.000	1.000	1.000	
fA	1.000	1.000					1.000	1.000	1.000	1.000	
fLU	1.000	1.000					0.908	1.000	1.000	0.908	
fRT	1.000	0.850					1.000	0.850		1.000	
fLT	0.952						1.000		0.950	1.000	
Sec.											
fLpb	1.000						1.000		1.000	1.000	
fRpb	1.000	1.000					1.000	1.000		1.000	
S	1774	1583					6765	1583	1770	6765	
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	429	1774	#	0.24	0.26	466	0.92
Right	R	349	1583		0.22	0.26	416	0.84
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1149	6765		0.17	0.37	2495	0.46
Right	R	551	1583	#	0.35	0.37	584	0.94
Southbound								
Prot								
Perm								
Left	L	386	1770	#	0.22	0.22	398	0.97
Prot								
Perm								
Thru	T	777	6765		0.11	0.64	4330	0.18
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.81
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.94

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
LT	0.92	0.26	28.7	1.000	466	0.44	23.6	0.0	52.3	D	47.7	D
R	0.84	0.26	27.9	1.000	416	0.37	14.1	0.0	42.0	D		
Westbound												
Northbound												
T	0.46	0.37	19.2	1.000	2495	0.11	0.1	0.0	19.3	B	28.8	C
R	0.94	0.37	24.4	1.000	584	0.46	24.1	0.0	48.5	D		
Southbound												
L	0.97	0.22	30.7	1.000	398	0.48	37.1	0.0	67.8	E		

T 0.18 0.64 5.9 1.000 4330 0.11 0.0 0.0 5.9 A 26.4 C

Intersection delay = 32.1 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	80.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	80.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		1.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

LT	0.0	0.00	29.5	28.7	0.00	0.0	0.0	52.3
R	0.0	0.00	29.5	27.9	0.00	0.0	0.0	42.0
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	25.3	19.2	0.00	0.0	0.0	19.3
R	0.0	0.00	25.3	24.4	0.00	0.0	0.0	48.5
Southbound								
L	0.0	0.00	31.0	30.7	0.00	0.0	0.0	67.8
T	0.0	0.00	14.4	5.9	0.00	0.0	0.0	5.9
	0.0						0.0	

Intersection Delay 32.1 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	LT	R					T	R		L	T	
Init Queue	0.0	0.0					0.0	0.0		0.0	0.0	
Flow Rate	429	349					316	551		386	213	
So	1900	1900					1900	1900		1900	1900	
No.Lanes	0 1	1		0	0	0	0 4	1		1	4	0
SL	1774	1583					1862	1583		1770	1862	
LnCapacity	466	416					686	584		398	1192	
Flow Ratio	0.2	0.2					0.2	0.3		0.2	0.1	
v/c Ratio	0.92	0.84					0.46	0.94		0.97	0.18	
Grn Ratio	0.26	0.26					0.37	0.37		0.22	0.64	
I Factor	1.000						1.000				1.000	
AT or PVG	3	3					3	3		3	3	
Pltn Ratio	1.00	1.00					1.00	1.00		1.00	1.00	
PF2	1.00	1.00					1.00	1.00		1.00	1.00	
Q1	9.3	7.3					5.3	11.9		8.5	1.9	
kB	0.4	0.4					0.5	0.5		0.4	0.7	
Q2	2.9	1.7					0.4	4.0		3.5	0.2	
Q Average	12.2	9.0					5.8	15.8		12.0	2.1	
Q Spacing	25.0	25.0					25.0	25.0		25.0	25.0	
Q Storage	0	0					0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2					1.2	1.2		1.2	1.2	
BOQ	14.3	10.6					6.9	18.5		14.1	2.5	
QSRatio												
85th Percentile Output:												
fB%	1.5	1.5					1.5	1.5		1.5	1.6	
BOQ	18.3	13.7					8.9	23.4		18.1	3.3	
QSRatio												
90th Percentile Output:												
fB%	1.6	1.7					1.7	1.6		1.6	1.8	
BOQ	19.7	14.9					9.8	25.0		19.5	3.7	
QSRatio												
95th Percentile Output:												
fB%	1.8	1.9					1.9	1.7		1.8	2.0	
BOQ	22.0	16.8					11.2	27.7		21.8	4.2	
QSRatio												
98th Percentile Output:												
fB%	2.1	2.2					2.3	2.0		2.1	2.6	
BOQ	25.5	19.8					13.5	31.6		25.2	5.3	
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Newport Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Volume	279	63	436	73		157		1063	84	173	1751	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		A			NB Left				
Thru		A			Thru		A	A	
Right	A	A			Right		A	A	
Peds					Peds				
WB Left	A				SB Left	A			
Thru					Thru	A	A	A	
Right	A				Right				
Peds					Peds				
NB Right					EB Right	A	A	A	
SB Right					WB Right				
Green	7.5	12.4	0.0			8.1	6.3	7.5	0.0
Yellow	3.6	3.6				3.2	3.9	3.9	
All Red	1.0	1.0				1.0	1.0	1.0	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	338	1770	0.87	0.19	46.4	D		
LT	355	1863	0.19	0.19	22.3	C	18.5	B
R	1583	1583	0.29	1.00	0.1	A		
Westbound								
L	204	1770	0.38	0.12	27.8	C		
							55.5	E
R	183	1583	0.90	0.12	68.5	E		
Northbound								
TR	1444	5019	0.84	0.29	26.2	C	26.2	C
Southbound								
L	221	1770	0.82	0.12	49.4	D		
T	2420	5074	0.76	0.48	15.4	B	18.5	B

Intersection Delay = 22.7 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Newport Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	279	63	436	73		157		1063	84	173	1751	
% Heavy Veh	2	2	2	2		2		2	2	2	2	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol	73	17	115	19		41		280	22	46	461	
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900	1900	1900		1900		1900		1900	1900	
ParkExist												
NumPark												
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol		0				0			0			
Adj Flow	294	66	459	77		165		1207		182	1843	
%InSharedLn	0											
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.073			0.000	
Peds Bikes	0			0			0					
Buses	0	0	0	0		0		0		0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Arriv. Type	3	3	3	3		3		3		3	3	
Unit Ext.	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right	A	A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right	A	A	A
SB Right					WB Right			
Green	7.5	12.4	0.0			8.1	6.3	7.5	0.0
Yellow	3.6	3.6				3.2	3.9	3.9	
All Red	1.0	1.0				1.0	1.0	1.0	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	279	63	436	73		157		1063	84	173	1751	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow	294	66	459	77		165		1119	88	182	1843	
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
Lane group	L	LT	R	L		R		TR		L	T	
Adj flow	294	66	459	77		165		1207		182	1843	
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.073			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LT	R	L		R	TR			L	T	
So	1900	1900	1900	1900		1900	1900			1900	1900	
Lanes	1	1	1	1	0	1	0	3	0	1	3	0
fW	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fHV	0.980	0.980	0.980	0.980		0.980		0.980		0.980	0.980	
fG	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fP	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fBB	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fA	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fLU	1.000	1.000	1.000	1.000		1.000		0.908		1.000	0.908	
fRT		1.000	0.850			0.850		0.989			1.000	
fLT	0.950	1.000		0.950				1.000		0.950	1.000	
Sec.												
fLpb	1.000	1.000		1.000				1.000		1.000	1.000	
fRpb		1.000	1.000			1.000		1.000			1.000	
S	1770	1863	1583	1770		1583		5019		1770	5074	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	294	1770	#	0.17	0.19	338	0.87
Prot								
Perm								
Thru	LT	66	1863		0.04	0.19	355	0.19
Right	R	459	1583		0.29	1.00	1583	0.29
Westbound								
Prot								
Perm								
Left	L	77	1770		0.04	0.12	204	0.38
Prot								
Perm								
Thru								
Right	R	165	1583	#	0.10	0.12	183	0.90
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1207	5019		0.24	0.29	1444	0.84
Right								
Southbound								
Prot								
Perm								
Left	L	182	1770		0.10	0.12	221	0.82
Prot								
Perm								
Thru	T	1843	5074	#	0.36	0.48	2420	0.76
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.63
Total lost time per cycle, L = 14.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.81

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.87	0.19	25.5	1.000	338	0.40	20.9	0.0	46.4	D		
LT	0.19	0.19	22.1	1.000	355	0.11	0.3	0.0	22.3	C	18.5	B
R	0.29	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Westbound												
L	0.38	0.12	26.6	1.000	204	0.11	1.2	0.0	27.8	C		
											55.5	E
R	0.90	0.12	28.4	1.000	183	0.42	40.1	0.0	68.5	E		
Northbound												
TR	0.84	0.29	21.7	1.000	1444	0.37	4.5	0.0	26.2	C	26.2	C
Southbound												
L	0.82	0.12	27.8	1.000	221	0.36	21.6	0.0	49.4	D		

T	0.76	0.48	14.0	1.000	2420	0.31	1.5	0.0	15.4	B	18.5	B

Intersection delay = 22.7 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	26.3	25.5	0.00	0.0	0.0	46.4

LT	0.0	0.00	26.3	22.1	0.00	0.0	0.0	22.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Westbound								
L	0.0	0.00	28.8	26.6	0.00	0.0	0.0	27.8
	0.0						0.0	
R	0.0	0.00	28.8	28.4	0.00	0.0	0.0	68.5
Northbound								
	0.0						0.0	
TR	0.0	0.00	23.1	21.7	0.00	0.0	0.0	26.2
	0.0						0.0	
Southbound								
L	0.0	0.00	28.4	27.8	0.00	0.0	0.0	49.4
T	0.0	0.00	17.0	14.0	0.00	0.0	0.0	15.4
	0.0						0.0	

Intersection Delay 22.7 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound	Southbound	
LaneGroup	L	LT	R	L	R	TR	L	T
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate	294	66	459	77	165	443	182	676
So	1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	1	1	1	1 0	1	0 3 0	1	3 0
SL	1770	1863	1583	1770	1583	1842	1770	1862
LnCapacity	338	355	1583	204	183	530	221	888
Flow Ratio	0.2	0.0	0.3	0.0	0.1	0.2	0.1	0.4
v/c Ratio	0.87	0.19	0.29	0.38	0.90	0.84	0.82	0.76
Grn Ratio	0.19	0.19	1.00	0.12	0.12	0.29	0.12	0.48
I Factor		1.000		1.000		1.000		1.000
AT or PVG	3	3	3	3	3	3	3	3
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1	5.2	1.0		1.3	2.9	7.5	3.2	10.0
kB	0.3	0.3	0.7	0.2	0.2	0.4	0.2	0.5
Q2	1.5	0.1	0.3	0.1	1.2	1.7	0.9	1.6
Q Average	6.7	1.1		1.4	4.2	9.2	4.1	11.6
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage	0	0	0	0	0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2		1.2	1.2	1.2	1.2	1.2
BOQ	7.9	1.3		1.7	4.9	10.9	4.9	13.6
QSRatio								
85th Percentile Output:								
fB%	1.5	1.6		1.6	1.6	1.5	1.6	1.5
BOQ	10.3	1.7		2.2	6.5	14.0	6.4	17.5
QSRatio								
90th Percentile Output:								
fB%	1.7	1.8		1.8	1.7	1.7	1.7	1.6
BOQ	11.3	1.9		2.5	7.2	15.2	7.1	18.9
QSRatio								
95th Percentile Output:								
fB%	1.9	2.1		2.1	2.0	1.9	2.0	1.8
BOQ	12.8	2.2		2.9	8.2	17.1	8.1	21.1
QSRatio								
98th Percentile Output:								
fB%	2.3	2.6		2.6	2.4	2.2	2.4	2.1
BOQ	15.4	2.8		3.7	10.1	20.2	10.0	24.5
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-5 SB Ramps

Inter.: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Newport Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Volume	371	50	579	77		173		1781	95	248	1126	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right	A	A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right	A	A	A
SB Right					WB Right			
Green	15.1	21.7	0.0			17.1	41.3	6.6	0.0
Yellow	3.6	3.6				3.2	3.9	3.9	
All Red	1.0	1.0				1.0	1.0	1.0	

Cycle Length: 125.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	307	1770	1.27	0.17	197.8	F		
LT	323	1863	0.16	0.17	44.2	D	75.8	E
R	1583	1583	0.38	1.00	0.2	A		
Westbound								
L	214	1770	0.38	0.12	51.7	D		
							89.4	F
R	191	1583	0.95	0.12	106.1	F		
Northbound								
TR	2127	5036	0.93	0.42	42.2	D	42.2	D
Southbound								
L	242	1770	1.08	0.14	134.2	F		
T	3008	5074	0.39	0.59	13.6	B	35.4	D

Intersection Delay = 50.2 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Newport Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-5 SB Ramps N/S St: Newport Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	371	50	579	77		173		1781	95	248	1126	
% Heavy Veh	2	2	2	2		2		2	2	2	2	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol	98	13	152	20		46		469	25	65	296	
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900	1900	1900		1900		1900		1900	1900	
ParkExist												
NumPark												
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol			0			0			0			
Adj Flow	391	53	609	81		182		1975		261	1185	
%InSharedLn	0											
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.051			0.000	
Peds Bikes	0				0			0				
Buses	0	0	0	0		0		0		0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Arriv. Type	3	3	3	3		3		3		3	3	
Unit Ext.	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right	A	A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right	A	A	A
SB Right					WB Right			
Green	15.1	21.7	0.0			17.1	41.3	6.6	0.0
Yellow	3.6	3.6				3.2	3.9	3.9	
All Red	1.0	1.0				1.0	1.0	1.0	

Cycle Length: 125.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	371	50	579	77		173		1781	95	248	1126	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow	391	53	609	81		182		1875	100	261	1185	
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
Lane group	L	LT	R	L		R		TR		L	T	
Adj flow	391	53	609	81		182		1975		261	1185	
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.051			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LT	R	L		R	TR			L	T	
So	1900	1900	1900	1900		1900	1900			1900	1900	
Lanes	1	1	1	1	0	1	0	3	0	1	3	0
fW	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fHV	0.980	0.980	0.980	0.980		0.980		0.980		0.980	0.980	
fG	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fP	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fBB	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fA	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fLU	1.000	1.000	1.000	1.000		1.000		0.908		1.000	0.908	
fRT		1.000	0.850			0.850		0.992			1.000	
fLT	0.950	1.000		0.950				1.000		0.950	1.000	
Sec.												
fLpb	1.000	1.000		1.000				1.000		1.000	1.000	
fRpb		1.000	1.000			1.000		1.000			1.000	
S	1770	1863	1583	1770		1583		5036		1770	5074	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	391	1770	#	0.22	0.17	307	1.27
Prot								
Perm								
Thru	LT	53	1863		0.03	0.17	323	0.16
Right	R	609	1583		0.38	1.00	1583	0.38
Westbound								
Prot								
Perm								
Left	L	81	1770		0.05	0.12	214	0.38
Prot								
Perm								
Thru								
Right	R	182	1583	#	0.11	0.12	191	0.95
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1975	5036	#	0.39	0.42	2127	0.93
Right								
Southbound								
Prot								
Perm								
Left	L	261	1770	#	0.15	0.14	242	1.08
Prot								
Perm								
Thru	T	1185	5074		0.23	0.59	3008	0.39
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.88
Total lost time per cycle, L = 18.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.03

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.27	0.17	51.6	1.000	307	0.50	146.1	0.0	197.8	F		
LT	0.16	0.17	43.9	1.000	323	0.11	0.2	0.0	44.2	D	75.8	E
R	0.38	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Westbound												
L	0.38	0.12	50.6	1.000	214	0.11	1.1	0.0	51.7	D		
											89.4	F
R	0.95	0.12	54.6	1.000	191	0.46	51.5	0.0	106.1	F		
Northbound												
TR	0.93	0.42	34.3	1.000	2127	0.44	7.9	0.0	42.2	D	42.2	D
Southbound												
L	1.08	0.14	53.9	1.000	242	0.50	80.3	0.0	134.2	F		

T	0.39	0.59	13.5	1.000	3008	0.11	0.1	0.0	13.6	B	35.4	D

Intersection delay = 50.2 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	125.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	51.6	51.6	0.00	21.0	0.0	197.8

LT	0.0	0.00	51.6	43.9	0.00	0.0	0.0	44.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
L	0.0	0.00	54.9	50.6	0.00	0.0	0.0	51.7
	0.0						0.0	
R	0.0	0.00	54.9	54.6	0.00	0.0	0.0	106.1
Northbound								
	0.0						0.0	
TR	0.0	0.00	36.1	34.3	0.00	0.0	0.0	42.2
	0.0						0.0	
Southbound								
L	0.0	0.00	53.9	53.9	0.00	4.8	0.0	134.2
T	0.0	0.00	25.4	13.5	0.00	0.0	0.0	13.6
	0.0						0.0	

Intersection Delay 50.2 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound	Southbound	
LaneGroup	L	LT	R	L	R	TR	L	T
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate	391	53	609	81	182	725	261	435
So	1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	1	1	1	1 0	1	0 3 0	1	3 0
SL	1770	1863	1583	1770	1583	1848	1770	1862
LnCapacity	307	323	1583	214	191	780	242	1104
Flow Ratio	0.2	0.0	0.4	0.0	0.1	0.4	0.1	0.2
v/c Ratio	1.27	0.16	0.38	0.38	0.95	0.93	1.08	0.39
Grn Ratio	0.17	0.17	1.00	0.12	0.12	0.42	0.14	0.59
I Factor		1.000		1.000		1.000		1.000
AT or PVG	3	3	3	3	3	3	3	3
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1	13.6	1.6		2.6	6.3	23.9	9.1	8.0
kB	0.4	0.4	1.1	0.3	0.3	0.7	0.4	0.9
Q2	12.2	0.1	0.7	0.2	2.2	5.4	4.8	0.6
Q Average	25.7	1.6		2.8	8.4	29.3	13.9	8.6
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage	0	0	0	0	0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2		1.2	1.2	1.1	1.2	1.2
BOQ	29.7	2.0		3.3	10.0	33.6	16.2	10.2
QSRatio								
85th Percentile Output:								
fB%	1.4	1.6		1.6	1.5	1.4	1.5	1.5
BOQ	36.7	2.6		4.4	12.9	41.4	20.7	13.1
QSRatio								
90th Percentile Output:								
fB%	1.5	1.8		1.7	1.7	1.5	1.6	1.7
BOQ	38.9	2.9		4.9	14.0	43.7	22.2	14.3
QSRatio								
95th Percentile Output:								
fB%	1.6	2.0		2.0	1.9	1.6	1.8	1.9
BOQ	42.3	3.4		5.6	15.8	47.4	24.7	16.1
QSRatio								
98th Percentile Output:								
fB%	1.8	2.6		2.5	2.2	1.8	2.0	2.2
BOQ	47.3	4.3		7.0	18.8	52.9	28.4	19.1
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 NB Ramps

Inter.: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Volume				760		556		794	560		1290	930
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left	A				SB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	26.6	0.0				2.3	9.4	0.0	
Yellow	4.3					4.3	3.6		
All Red	3.5					3.5	2.5		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1524	3437	0.52	0.44	12.5	B		
							17.0	B
R	702	1583	0.83	0.44	23.3	C		
Northbound								
T	1649	5074	0.51	0.32	16.6	B	9.8	A
R	1583	1583	0.37	1.00	0.1	A		
Southbound								
T	1649	5074	0.82	0.32	22.2	C	13.2	B
R	1583	1583	0.62	1.00	0.7	A		

Intersection Delay = 13.3 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Culver at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 NB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				760		556		794	560		1290	930
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				200		146		209	147		339	245
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				800		585		836	589		1358	979
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		26.6	0.0			2.3	9.4	0.0
Yellow		4.3				4.3	3.6	
All Red		3.5				3.5	2.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				760		556		794	560		1290	930
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				800		585		836	589		1358	979
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
Lane group				L		R		T	R		T	R
Adj flow				800		585		836	589		1358	979
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		T		R
So				1900		1900	1900	1900		1900		1900
Lanes	0	0	0	2	0	1	0 3	1	0	3		1
fW				1.000		1.000	1.000	1.000		1.000		1.000
fHV				0.980		0.980	0.980	0.980		0.980		0.980
fG				1.000		1.000	1.000	1.000		1.000		1.000
fP				1.000		1.000	1.000	1.000		1.000		1.000
fBB				1.000		1.000	1.000	1.000		1.000		1.000
fA				1.000		1.000	1.000	1.000		1.000		1.000
fLU				0.971		1.000	0.908	1.000		0.908		1.000
fRT						0.850	1.000	0.850		1.000		0.850
fLT				0.950			1.000			1.000		
Sec.												
fLpb				1.000			1.000			1.000		
fRpb						1.000	1.000	1.000		1.000		1.000
S				3437		1583	5074	1583		5074		1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	800	3437		0.23	0.44	1524	0.52
Prot								
Perm								
Thru								
Right	R	585	1583	#	0.37	0.44	702	0.83
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	836	5074		0.16	0.32	1649	0.51
Right	R	589	1583		0.37	1.00	1583	0.37
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1358	5074	#	0.27	0.32	1649	0.82
Right	R	979	1583		0.62	1.00	1583	0.62

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.64
Total lost time per cycle, L = 13.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.83

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.52	0.44	12.1	1.000	1524	0.13	0.3	0.0	12.5	B		
											17.0	B
R	0.83	0.44	14.7	1.000	702	0.37	8.5	0.0	23.3	C		
Northbound												
T	0.51	0.32	16.4	1.000	1649	0.12	0.3	0.0	16.6	B	9.8	A
R	0.37	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.82	0.32	18.7	1.000	1649	0.36	3.5	0.0	22.2	C	13.2 B
R	0.62	1.00	0.0	0.950	1583	0.20	0.7	0.0	0.7	A	

Intersection delay = 13.3 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT				0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	16.7	12.1	0.00	0.0	0.0	12.5
	0.0						0.0	
R	0.0	0.00	16.7	14.7	0.00	0.0	0.0	23.3
Northbound								
	0.0						0.0	
T	0.0	0.00	20.3	16.4	0.00	0.0	0.0	16.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	20.3	18.7	0.00	0.0	0.0	22.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.7

Intersection Delay 13.3 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				411	585	306	589	498	979
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2 0	1	0 3	1	0 3	1
SL				1770	1583	1862	1583	1862	1583
LnCapacity				784	702	605	1583	605	1583
Flow Ratio				0.2	0.4	0.2	0.4	0.3	0.6
v/c Ratio				0.52	0.83	0.51	0.37	0.82	0.62
Grn Ratio				0.44	0.44	0.32	1.00	0.32	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00		1.00	
Q1				5.0	8.6	4.1		7.6	
kB				0.5	0.4	0.4	0.7	0.4	0.7
Q2				0.5	1.9	0.4	0.4	1.7	1.1
Q Average				5.5	10.5	4.5		9.3	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2	1.2	1.2		1.2	
BOQ				6.5	12.4	5.4		11.0	
QSRatio									
85th Percentile Output:									
fB%				1.5	1.5	1.6		1.5	
BOQ				8.5	15.9	7.0		14.1	
QSRatio									
90th Percentile Output:									
fB%				1.7	1.6	1.7		1.7	
BOQ				9.3	17.2	7.8		15.4	
QSRatio									
95th Percentile Output:									
fB%				1.9	1.8	2.0		1.9	
BOQ				10.6	19.3	8.9		17.3	
QSRatio									
98th Percentile Output:									
fB%				2.4	2.1	2.4		2.2	
BOQ				12.9	22.6	10.9		20.4	
QSRatio									

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 NB Ramps

Inter.: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Volume				449		807		2053	400		1201	660
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right	A	A		
Peds					Peds				
NB Right		A			EB Right				
SB Right		A			WB Right				
Green		52.2	0.0			31.2	14.9	0.0	
Yellow		4.3				4.3	3.6		
All Red		3.5				3.5	2.5		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1495	3437	0.32	0.44	22.3	C		
							104.8	F
R	689	1583	1.23	0.44	150.8	F		
Northbound								
T	2279	5074	0.95	0.45	41.2	D	34.5	C
R	1583	1583	0.27	1.00	0.1	A		
Southbound								
T	2279	5074	0.55	0.45	24.5	C	15.9	B
R	1583	1583	0.44	1.00	0.2	A		

Intersection Delay = 44.1 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Culver at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 NB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				449		807		2053	400		1201	660
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				118		212		540	105		316	174
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				473		849		2161	421		1264	695
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		52.2	0.0			31.2	14.9	0.0
Yellow		4.3				4.3	3.6	
All Red		3.5				3.5	2.5	

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				449		807		2053	400		1201	660
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				473		849		2161	421		1264	695
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
Lane group				L		R		T	R		T	R
Adj flow				473		849		2161	421		1264	695
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		T		R
So				1900		1900	1900	1900		1900		1900
Lanes	0	0	0	2	0	1	0 3	1	0	3		1
fW				1.000		1.000	1.000	1.000		1.000		1.000
fHV				0.980		0.980	0.980	0.980		0.980		0.980
fG				1.000		1.000	1.000	1.000		1.000		1.000
fP				1.000		1.000	1.000	1.000		1.000		1.000
fBB				1.000		1.000	1.000	1.000		1.000		1.000
fA				1.000		1.000	1.000	1.000		1.000		1.000
fLU				0.971		1.000	0.908	1.000		0.908		1.000
fRT						0.850	1.000	0.850		1.000		0.850
fLT				0.950			1.000			1.000		
Sec.												
fLpb				1.000			1.000			1.000		
fRpb						1.000	1.000	1.000		1.000		1.000
S				3437		1583	5074	1583		5074		1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	473	3437		0.14	0.44	1495	0.32
Prot								
Perm								
Thru								
Right	R	849	1583	#	0.54	0.44	689	1.23
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2161	5074	#	0.43	0.45	2279	0.95
Right	R	421	1583		0.27	1.00	1583	0.27
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1264	5074		0.25	0.45	2279	0.55
Right	R	695	1583		0.44	1.00	1583	0.44

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.96
Total lost time per cycle, L = 13.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.09

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.32	0.44	22.2	1.000	1495	0.11	0.1	0.0	22.3	C		
											104.8	F
R	1.23	0.44	33.9	1.000	689	0.50	116.9	0.0	150.8	F		
Northbound												
T	0.95	0.45	31.7	1.000	2279	0.46	9.5	0.0	41.2	D	34.5	C
R	0.27	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.55	0.45	24.2	1.000	2279	0.15	0.3	0.0	24.5	C	15.9	B
R	0.44	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 44.1 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	120.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	33.9	22.2	0.00	0.0	0.0	22.3
	0.0						0.0	
R	0.0	0.00	33.9	33.9	0.00	40.0	0.0	150.8
Northbound								
	0.0						0.0	
T	0.0	0.00	33.0	31.7	0.00	0.0	0.0	41.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	33.0	24.2	0.00	0.0	0.0	24.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 44.1 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				243	849	793	421	464	695
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2 0	1	0 3	1	0 3	1
SL				1770	1583	1862	1583	1862	1583
LnCapacity				769	689	836	1583	836	1583
Flow Ratio				0.1	0.5	0.4	0.3	0.2	0.4
v/c Ratio				0.32	1.23	0.95	0.27	0.56	0.44
Grn Ratio				0.44	0.44	0.45	1.00	0.45	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00		1.00	
Q1				5.3	28.3	25.4		11.3	
kB				0.7	0.7	0.7	1.1	0.7	1.1
Q2				0.3	23.0	6.3	0.4	0.9	0.8
Q Average				5.6	51.3	31.6		12.2	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2	1.1	1.1		1.2	
BOQ				6.7	57.9	36.2		14.4	
QSRatio									
85th Percentile Output:									
fB%				1.5	1.4	1.4		1.5	
BOQ				8.7	69.5	44.4		18.4	
QSRatio									
90th Percentile Output:									
fB%				1.7	1.4	1.5		1.6	
BOQ				9.6	73.4	46.9		19.8	
QSRatio									
95th Percentile Output:									
fB%				1.9	1.5	1.6		1.8	
BOQ				10.9	78.8	50.7		22.1	
QSRatio									
98th Percentile Output:									
fB%				2.3	1.7	1.8		2.1	
BOQ				13.2	88.2	56.6		25.6	
QSRatio									

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 SB Ramps

Inter.: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	300	0	530					986	231		1752	251
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	26.4	0.0				6.1	22.8	0.0	
Yellow	3.6					4.3	4.3		
All Red	2.5					2.5	2.5		

Cycle Length: 75.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	623	1770	0.51	0.35	19.9	B		
LTR	656	1863	0.00	0.35	15.7	B	47.3	D
R	557	1583	1.00	0.35	62.9	E		
Westbound								
Northbound								
T	2415	5074	0.43	0.48	13.1	B	10.6	B
R	1583	1583	0.15	1.00	0.0+	A		
Southbound								
T	2415	5074	0.76	0.48	17.7	B	15.5	B
R	1583	1583	0.17	1.00	0.1	A		

Intersection Delay = 20.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Culver at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	300	0	530					986	231		1752	251
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	79	0	139					259	61		461	66
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	316	0	558					1038	243		1844	264
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	26.4	0.0			6.1	22.8	0.0	
Yellow	3.6				4.3	4.3		
All Red	2.5				2.5	2.5		

Cycle Length: 75.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	300	0	530					986	231		1752	251
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	316	0	558					1038	243		1844	264
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR R					T	R		T	R
Adj flow	316	0	558					1038	243		1844	264
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound				Northbound			Southbound	
LG	L	LTR	R					T	R		T	R
So	1900	1900	1900					1900	1900		1900	1900
Lanes	1	1	1	0	0	0	0	3	1	0	3	1
fW	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980					0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fLU	1.000	1.000	1.000					0.908	1.000		0.908	1.000
fRT		1.000	0.850					1.000	0.850		1.000	0.850
fLT	0.950	1.000						1.000			1.000	
Sec.												
fLpb	1.000	1.000						1.000			1.000	
fRpb		1.000	1.000					1.000	1.000		1.000	1.000
S	1770	1863	1583					5074	1583		5074	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	316	1770		0.18	0.35	623	0.51
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.35	656	0.00
Right	R	558	1583	#	0.35	0.35	557	1.00
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1038	5074		0.20	0.48	2415	0.43
Right	R	243	1583		0.15	1.00	1583	0.15
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1844	5074	#	0.36	0.48	2415	0.76
Right	R	264	1583		0.17	1.00	1583	0.17

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.72
Total lost time per cycle, L = 12.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.86

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.51	0.35	19.2	1.000	623	0.12	0.7	0.0	19.9	B		
LTR	0.00	0.35	15.7	1.000	656	0.11	0.0	0.0	15.7	B	47.3	D
R	1.00	0.35	24.3	1.000	557	0.50	38.6	0.0	62.9	E		
Westbound												
Northbound												
T	0.43	0.48	12.9	1.000	2415	0.11	0.1	0.0	13.1	B	10.6	B
R	0.15	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Southbound												

T	0.76	0.48	16.2	1.000	2415	0.32	1.5	0.0	17.7	B	15.5	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 20.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	75.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	24.3	19.2	0.00	0.0	0.0	19.9

LTR	0.0	0.00	24.3	15.7	0.00	0.0	0.0	15.7
R	0.0	0.00	24.3	24.3	0.00	0.2	0.0	62.9
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	19.7	12.9	0.00	0.0	0.0	13.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Southbound								
	0.0						0.0	
T	0.0	0.00	19.7	16.2	0.00	0.0	0.0	17.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 20.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup	L	LTR	R				T	R	T	R
Init Queue	0.0	0.0	0.0				0.0	0.0	0.0	0.0
Flow Rate	316	0	558				381	243	676	264
So	1900	1900	1900				1900	1900	1900	1900
No.Lanes	1	1	1	0	0	0	3	1	3	1
SL	1770	1863	1583				1862	1583	1862	1583
LnCapacity	623	656	557				886	1583	886	1583
Flow Ratio	0.2	0.0	0.4				0.2	0.2	0.4	0.2
v/c Ratio	0.51	0.00	1.00				0.43	0.15	0.76	0.17
Grn Ratio	0.35	0.35	0.35				0.48	1.00	0.48	1.00
I Factor		1.000					1.000		1.000	
AT or PVG	3	3	3				3	3	3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00				1.00		1.00	
Q1	5.2	0.0	11.6				5.2		11.6	
kB	0.5	0.5	0.4				0.6	0.8	0.6	0.8
Q2	0.5	0.0	5.6				0.4	0.1	1.7	0.2
Q Average	5.7	0.0	17.2				5.7		13.3	
Q Spacing	25.0	25.0	25.0				25.0	25.0	25.0	25.0
Q Storage	0	0	0				0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2	1.2				1.2		1.2	
BOQ	6.7	0.0	20.0				6.7		15.6	
QSRatio										
85th Percentile Output:										
fB%	1.5	1.6	1.5				1.5		1.5	
BOQ	8.8	0.0	25.3				8.8		19.9	
QSRatio										
90th Percentile Output:										
fB%	1.7	1.8	1.6				1.7		1.6	
BOQ	9.6	0.0	27.0				9.6		21.4	
QSRatio										
95th Percentile Output:										
fB%	1.9	2.1	1.7				1.9		1.8	
BOQ	11.0	0.0	29.8				11.0		23.8	
QSRatio										
98th Percentile Output:										
fB%	2.3	2.7	2.0				2.3		2.1	
BOQ	13.3	0.0	33.8				13.3		27.4	
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 SB Ramps

Inter.: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	898	0	502					1582	670		1228	330
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	37.7	0.0				13.0	4.6	0.0	
Yellow	3.6					4.3	4.3		
All Red	2.5					2.5	2.5		

Cycle Length: 75.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	890	1770	1.06	0.50	66.6	E		
LTR	936	1863	0.00	0.50	9.3	A	48.5	D
R	796	1583	0.66	0.50	16.0	B		
Westbound								
Northbound								
T	1651	5074	1.01	0.33	49.5	D	34.9	C
R	1583	1583	0.45	1.00	0.2	A		
Southbound								
T	1651	5074	0.78	0.33	25.4	C	20.1	C
R	1583	1583	0.22	1.00	0.1	A		

Intersection Delay = 34.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Culver at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	898	0	502					1582	670		1228	330
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	236	0	132					416	176		323	87
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	945	0	528					1665	705		1293	347
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	37.7	0.0			13.0	4.6	0.0	
Yellow	3.6				4.3	4.3		
All Red	2.5				2.5	2.5		

Cycle Length: 75.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	898	0	502					1582	670		1228	330
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	945	0	528					1665	705		1293	347
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	945	0	528					1665	705		1293	347
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound							Northbound							Southbound						
LG	L		LTR	R											T	R						T	R				
So	1900		1900	1900											1900	1900						1900	1900				
Lanes	1		1		0		0		0		0				3	1		0				3	1				
fW	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fHV	0.980		0.980	0.980											0.980	0.980						0.980	0.980				
fG	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fP	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fBB	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fA	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fLU	1.000		1.000	1.000											0.908	1.000						0.908	1.000				
fRT			1.000	0.850											1.000	0.850						1.000	0.850				
fLT	0.950		1.000												1.000							1.000					
Sec.																											
fLpb	1.000		1.000												1.000							1.000					
fRpb			1.000	1.000											1.000	1.000						1.000	1.000				
S	1770		1863	1583											5074	1583						5074	1583				
Sec.																											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	945	1770	#	0.53	0.50	890	1.06
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.50	936	0.00
Right	R	528	1583		0.33	0.50	796	0.66
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1665	5074	#	0.33	0.33	1651	1.01
Right	R	705	1583		0.45	1.00	1583	0.45
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1293	5074		0.25	0.33	1651	0.78
Right	R	347	1583		0.22	1.00	1583	0.22

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.86
Total lost time per cycle, L = 12.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.04

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.06	0.50	18.6	1.000	890	0.50	48.0	0.0	66.6	E		
LTR	0.00	0.50	9.3	1.000	936	0.11	0.0	0.0	9.3	A	48.5	D
R	0.66	0.50	13.9	1.000	796	0.24	2.1	0.0	16.0	B		
Westbound												
Northbound												
T	1.01	0.33	25.3	1.000	1651	0.50	24.2	0.0	49.5	D	34.9	C
R	0.45	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.78	0.33	22.9	1.000	1651	0.33	2.5	0.0	25.4	C	20.1	C
R	0.22	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 34.1 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	75.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	75.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	75.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	18.6	18.6	0.00	13.7	0.0	66.6

LTR	0.0	0.00	18.6	9.3	0.00	0.0	0.0	9.3
R	0.0	0.00	18.6	13.9	0.00	0.0	0.0	16.0
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	25.3	25.3	0.00	3.5	0.0	49.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	25.3	22.9	0.00	0.0	0.0	25.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 34.1 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	945	0	528				611	705		474	347	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	3	1	0	3	1	
SL	1770	1863	1583				1862	1583		1862	1583	
LnCapacity	890	936	796				606	1583		606	1583	
Flow Ratio	0.5	0.0	0.3				0.3	0.4		0.3	0.2	
v/c Ratio	1.06	0.00	0.66				1.01	0.45		0.78	0.22	
Grn Ratio	0.50	0.50	0.50				0.33	1.00		0.33	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	19.7	0.0	8.2				12.7			8.9		
kB	0.6	0.6	0.5				0.5	0.8		0.5	0.8	
Q2	12.4	0.0	1.0				6.2	0.7		1.5	0.2	
Q Average	32.1	0.0	9.2				19.0			10.4		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.2				1.2			1.2		
BOQ	36.7	0.0	10.9				22.0			12.3		
QSRatio												
85th Percentile Output:												
fB%	1.4	1.6	1.5				1.5			1.5		
BOQ	45.0	0.0	14.0				27.7			15.8		
QSRatio												
90th Percentile Output:												
fB%	1.5	1.8	1.7				1.6			1.6		
BOQ	47.5	0.0	15.3				29.5			17.1		
QSRatio												
95th Percentile Output:												
fB%	1.6	2.1	1.9				1.7			1.8		
BOQ	51.3	0.0	17.2				32.4			19.2		
QSRatio												
98th Percentile Output:												
fB%	1.8	2.7	2.2				1.9			2.1		
BOQ	57.2	0.0	20.2				36.6			22.4		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 NB Ramps

Inter.: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Volume				1413		969		1651	490		1717	1630
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left	A				SB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right	A	A		
Green	21.5	0.0				9.1	11.4	0.0	
Yellow	3.6					4.7	4.7		
All Red	2.0					1.5	1.5		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1727	4820	0.86	0.36	22.6	C		
							13.8	B
R	1583	1583	0.64	1.00	0.9	A		
Northbound								
T	2258	5074	0.77	0.44	15.7	B	12.2	B
R	1583	1583	0.33	1.00	0.1	A		
Southbound								
T	3010	6765	0.60	0.44	12.9	B	30.6	C
R	1583	1583	1.08	1.00	49.1	D		

Intersection Delay = 20.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1413		969		1651	490		1717	1630
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				372		255		434	129		452	429
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		3	0 1		0 3	1		0 4	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				1487		1020		1738	516		1807	1716
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right	A	A	
Green		21.5	0.0			9.1	11.4	0.0
Yellow		3.6				4.7	4.7	
All Red		2.0				1.5	1.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1413		969		1651	490		1717	1630
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				1487		1020		1738	516		1807	1716
No. Lanes	0	0	0		3	0 1		0 3	1		0 4	1
Lane group				L		R		T	R		T	R
Adj flow				1487		1020		1738	516		1807	1716
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T	R		T	R	
So			1900		1900		1900	1900		1900	1900	
Lanes	0	0	3	0	1	0	3	1	0	4	1	
fW			1.000		1.000		1.000	1.000		1.000	1.000	
fHV			0.980		0.980		0.980	0.980		0.980	0.980	
fG			1.000		1.000		1.000	1.000		1.000	1.000	
fP			1.000		1.000		1.000	1.000		1.000	1.000	
fBB			1.000		1.000		1.000	1.000		1.000	1.000	
fA			1.000		1.000		1.000	1.000		1.000	1.000	
fLU			0.908		1.000		0.908	1.000		0.908	1.000	
fRT					0.850		1.000	0.850		1.000	0.850	
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000	1.000		1.000	1.000	
S			4820		1583		5074	1583		6765	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Westbound							
Prot							
Perm							
Left	L	1487	4820	0.31	0.36	1727	0.86
Prot							
Perm							
Thru							
Right	R	1020	1583	0.64	1.00	1583	0.64
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1738	5074	0.34	0.44	2258	0.77
Right	R	516	1583	0.33	1.00	1583	0.33
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1807	6765	0.27	0.44	3010	0.60
Right	R	1716	1583	# 1.08	1.00	1583	1.08

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.08
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.08

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
Westbound												
L	0.86	0.36	17.9	1.000	1727	0.39	4.7	0.0	22.6	C		
											13.8	B
R	0.64	1.00	0.0	0.950	1583	0.22	0.9	0.0	0.9	A		
Northbound												
T	0.77	0.44	14.1	1.000	2258	0.32	1.7	0.0	15.7	B	12.2	B
R	0.33	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.60	0.44	12.6	1.000	3010	0.19	0.3	0.0	12.9	B	30.6 C
R	1.08	1.00	0.0	0.950	1583	0.50	49.1	0.0	49.1	D	

Intersection delay = 20.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.3	17.9	0.00	0.0	0.0	22.6
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.9
Northbound								
	0.0						0.0	
T	0.0	0.00	16.7	14.1	0.00	0.0	0.0	15.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	16.7	12.6	0.00	0.0	0.0	12.9
R	0.0	0.00	0.0	0.0	0.00	33.2	0.0	49.1

Intersection Delay 20.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				545	1020	638	516	497	1716
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	3	0 1	0 3	1	0 4	1
SL				1769	1583	1862	1583	1862	1583
LnCapacity				633	1583	828	1583	828	1583
Flow Ratio				0.3	0.6	0.3	0.3	0.3	1.1
v/c Ratio				0.86	0.64	0.77	0.33	0.60	1.08
Grn Ratio				0.36	1.00	0.44	1.00	0.44	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00		1.00		1.00	
Q1				8.4		9.0		6.3	
kB				0.4	0.7	0.5	0.7	0.5	0.7
Q2				2.1	1.3	1.5	0.3	0.7	23.2
Q Average				10.6		10.5		7.0	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2		1.2		1.2	
BOQ				12.4		12.4		8.3	
QSRatio									
85th Percentile Output:									
fB%				1.5		1.5		1.5	
BOQ				16.0		15.9		10.7	
QSRatio									
90th Percentile Output:									
fB%				1.6		1.6		1.7	
BOQ				17.3		17.2		11.8	
QSRatio									
95th Percentile Output:									
fB%				1.8		1.8		1.9	
BOQ				19.4		19.3		13.3	
QSRatio									
98th Percentile Output:									
fB%				2.1		2.1		2.3	
BOQ				22.6		22.5		16.0	
QSRatio									

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 NB Ramps

Inter.: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Volume				686		222		3348	900		2454	1140
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left	A				SB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right	A	A		
Green	16.9	0.0				55.8	19.3	0.0	
Yellow	3.6					4.7	4.7		
All Red	2.0					1.5	1.5		

Cycle Length: 110.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
Westbound								
L	741	4820	0.97	0.15	73.1	E		
							55.2	E
R	1583	1583	0.15	1.00	0.0+	A		
Northbound								
T	3750	5074	0.94	0.74	17.9	B	14.2	B
R	1583	1583	0.60	1.00	0.6	A		
Southbound								
T	5000	6765	0.52	0.74	6.2	A	4.9	A
R	1583	1583	0.76	1.00	2.2	A		

Intersection Delay = 14.6 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Jamboree at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				686	222			3348	900		2454	1140
% Heavy Veh				2	2			2	2		2	2
PHF				0.95	0.95			0.95	0.95		0.95	0.95
PK 15 Vol				181	58			881	237		646	300
Hi Ln Vol												
% Grade				0				0			0	
Ideal Sat				1900	1900			1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				722		234		3524	947		2583	1200
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right	A	A	
Green		16.9	0.0			55.8	19.3	0.0
Yellow		3.6				4.7	4.7	
All Red		2.0				1.5	1.5	

Cycle Length: 110.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				686	222			3348	900		2454	1140
PHF				0.95	0.95			0.95	0.95		0.95	0.95
Adj flow				722	234			3524	947		2583	1200
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
Lane group				L		R		T	R		T	R
Adj flow				722		234		3524	947		2583	1200
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T	R		T	R	
So			1900		1900		1900	1900		1900	1900	
Lanes	0	0	3	0	1	0	3	1	0	4	1	
fW			1.000		1.000		1.000	1.000		1.000	1.000	
fHV			0.980		0.980		0.980	0.980		0.980	0.980	
fG			1.000		1.000		1.000	1.000		1.000	1.000	
fP			1.000		1.000		1.000	1.000		1.000	1.000	
fBB			1.000		1.000		1.000	1.000		1.000	1.000	
fA			1.000		1.000		1.000	1.000		1.000	1.000	
fLU			0.908		1.000		0.908	1.000		0.908	1.000	
fRT					0.850		1.000	0.850		1.000	0.850	
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000	1.000		1.000	1.000	
S			4820		1583		5074	1583		6765	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	722	4820	#	0.15	0.15	741	0.97
Prot								
Perm								
Thru								
Right	R	234	1583		0.15	1.00	1583	0.15
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	3524	5074	#	0.69	0.74	3750	0.94
Right	R	947	1583		0.60	1.00	1583	0.60
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2583	6765		0.38	0.74	5000	0.52
Right	R	1200	1583		0.76	1.00	1583	0.76

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.84
Total lost time per cycle, L = 11.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.95

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.97	0.15	46.3	1.000	741	0.48	26.7	0.0	73.1	E		
											55.2	E
R	0.15	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Northbound												
T	0.94	0.74	12.3	1.000	3750	0.45	5.6	0.0	17.9	B	14.2	B
R	0.60	1.00	0.0	0.950	1583	0.19	0.6	0.0	0.6	A		
Southbound												

T	0.52	0.74	6.1	1.000	5000	0.12	0.1	0.0	6.2	A	4.9	A
R	0.76	1.00	0.0	0.950	1583	0.31	2.2	0.0	2.2	A		

Intersection delay = 14.6 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 110.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 110.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	110.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	46.5	46.3	0.00	0.0	0.0	73.1
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Northbound								
	0.0						0.0	
T	0.0	0.00	14.3	12.3	0.00	0.0	0.0	17.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.6
Southbound								
	0.0						0.0	
T	0.0	0.00	14.3	6.1	0.00	0.0	0.0	6.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.2

Intersection Delay 14.6 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				265	234	1293	947	711	1200
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	3	0 1	0 3	1	0 4	1
SL				1769	1583	1862	1583	1862	1583
LnCapacity				272	1583	1376	1583	1376	1583
Flow Ratio				0.1	0.1	0.7	0.6	0.4	0.8
v/c Ratio				0.97	0.15	0.94	0.60	0.52	0.76
Grn Ratio				0.15	1.00	0.74	1.00	0.74	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00		1.00		1.00	
Q1				8.1		33.7		9.2	
kB				0.4	1.0	0.9	1.0	0.9	1.0
Q2				3.0	0.2	8.2	1.5	1.0	3.0
Q Average				11.1		41.9		10.2	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2		1.1		1.2	
BOQ				13.0		47.6		12.0	
QSRatio									
85th Percentile Output:									
fB%				1.5		1.4		1.5	
BOQ				16.7		57.6		15.4	
QSRatio									
90th Percentile Output:									
fB%				1.6		1.4		1.6	
BOQ				18.1		60.8		16.7	
QSRatio									
95th Percentile Output:									
fB%				1.8		1.6		1.8	
BOQ				20.2		65.4		18.7	
QSRatio									
98th Percentile Output:									
fB%				2.1		1.7		2.2	
BOQ				23.6		73.0		21.9	
QSRatio									

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 SB Ramps

Inter.: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L		LTR	R				T	R		T	R
Volume	796	0	1542					1367	518		2813	274
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	57.8	0.0				39.6	4.2	0.0
Yellow	3.5					4.7	4.7	
All Red	1.5					2.0	2.0	

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	853	1770	0.98	0.48	57.0	E		
LTR	897	1863	0.00	0.48	16.1	B	104.8	F
R	1350	2803	1.20	0.48	129.4	F		
Westbound								
Northbound								
T	2847	6765	0.51	0.42	25.7	C	18.7	B
R	1583	1583	0.34	1.00	0.1	A		
Southbound								
T	2847	6765	1.04	0.42	63.2	E	57.6	E
R	1583	1583	0.18	1.00	0.1	A		

Intersection Delay = 62.6 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	796	0	1542					1367	518		2813	274
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	209	0	406					360	136		740	72
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L		LTR R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	838	0	1623					1439	545		2961	288
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	57.8	0.0			39.6	4.2	0.0	
Yellow	3.5				4.7	4.7		
All Red	1.5				2.0	2.0		

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	796	0	1542					1367	518		2813	274
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	838	0	1623					1439	545		2961	288
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
Lane group	L		LTR R					T	R		T	R
Adj flow	838	0	1623					1439	545		2961	288
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound				Northbound			Southbound	
LG	L	LTR	R					T	R		T	R
So	1900	1900	1900					1900	1900		1900	1900
Lanes	1	1	2	0	0	0	0	4	1	0	4	1
fW	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980					0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fLU	1.000	1.000	0.885					0.908	1.000		0.908	1.000
fRT		1.000	0.850					1.000	0.850		1.000	0.850
fLT	0.950	1.000						1.000			1.000	
Sec.												
fLpb	1.000	1.000						1.000			1.000	
fRpb		1.000	1.000					1.000	1.000		1.000	1.000
S	1770	1863	2803					6765	1583		6765	1583
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	838	1770		0.47	0.48	853	0.98
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.48	897	0.00
Right	R	1623	2803	#	0.58	0.48	1350	1.20
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1439	6765		0.21	0.42	2847	0.51
Right	R	545	1583		0.34	1.00	1583	0.34
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2961	6765	#	0.44	0.42	2847	1.04
Right	R	288	1583		0.18	1.00	1583	0.18

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.02
Total lost time per cycle, L = 11.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.13

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.98	0.48	30.6	1.000	853	0.49	26.4	0.0	57.0	E		
LTR	0.00	0.48	16.1	1.000	897	0.11	0.0	0.0	16.1	B	104.8	F
R	1.20	0.48	31.1	1.000	1350	0.50	98.3	0.0	129.4	F		
Westbound												
Northbound												
T	0.51	0.42	25.6	1.000	2847	0.11	0.1	0.0	25.7	C	18.7	B
R	0.34	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	1.04	0.42	34.7	1.000	2847	0.50	28.4	0.0	63.2	E	57.6	E
R	0.18	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 62.6 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	120.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	31.1	30.6	0.00	0.0	0.0	57.0

LTR	0.0	0.00	31.1	16.1	0.00	0.0	0.0	16.1
R	0.0	0.00	31.1	31.1	0.00	68.3	0.0	129.4
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	34.7	25.6	0.00	0.0	0.0	25.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	34.7	34.7	0.00	28.5	0.0	63.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 62.6 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	838	0	916				396	545		815	288	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	2	0	0	0	0	4	1	0	4	1
SL	1770	1863	1584				1862	1583		1862	1583	
LnCapacity	853	897	762				783	1583		783	1583	
Flow Ratio	0.5	0.0	0.6				0.2	0.3		0.4	0.2	
v/c Ratio	0.98	0.00	1.20				0.51	0.34		1.04	0.18	
Grn Ratio	0.48	0.48	0.48				0.42	1.00		0.42	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	27.5	0.0	30.5				9.7			27.2		
kB	0.7	0.8	0.7				0.7	1.1		0.7	1.1	
Q2	7.9	0.0	22.8				0.7	0.6		10.7	0.2	
Q Average	35.4	0.0	53.3				10.4			37.9		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.1				1.2			1.1		
BOQ	40.4	0.0	60.0				12.3			43.2		
QSRatio												
85th Percentile Output:												
fB%	1.4	1.6	1.4				1.5			1.4		
BOQ	49.3	0.0	72.0				15.8			52.5		
QSRatio												
90th Percentile Output:												
fB%	1.5	1.8	1.4				1.6			1.5		
BOQ	52.0	0.0	76.1				17.1			55.3		
QSRatio												
95th Percentile Output:												
fB%	1.6	2.1	1.5				1.8			1.6		
BOQ	56.1	0.0	81.6				19.1			59.6		
QSRatio												
98th Percentile Output:												
fB%	1.8	2.7	1.7				2.1			1.8		
BOQ	62.6	0.0	91.5				22.4			66.5		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 SB Ramps

Inter.: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Volume	1447	0	662					2723	990		2648	660
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	57.8	0.0				39.6	4.2	0.0	
Yellow	3.5					4.7	4.7		
All Red	1.5					2.0	2.0		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	853	1770	1.79	0.48	389.3	F		
LTR	897	1863	0.00	0.48	16.1	B	273.9	F
R	1350	2803	0.52	0.48	21.8	C		
Westbound								
Northbound								
T	2847	6765	1.01	0.42	53.2	D	39.3	D
R	1583	1583	0.66	1.00	1.0	A		
Southbound								
T	2847	6765	0.98	0.42	46.6	D	37.3	D
R	1583	1583	0.44	1.00	0.2	A		

Intersection Delay = 92.8 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	1447	0	662					2723	990		2648	660
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	381	0	174					717	261		697	174
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L		LTR R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	1523	0	697					2866	1042		2787	695
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	57.8	0.0			39.6	4.2	0.0	
Yellow	3.5				4.7	4.7		
All Red	1.5				2.0	2.0		

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	1447	0	662					2723	990		2648	660
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	1523	0	697					2866	1042		2787	695
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
Lane group	L		LTR R					T	R		T	R
Adj flow	1523	0	697					2866	1042		2787	695
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound				Northbound			Southbound	
LG	L	LTR	R					T	R		T	R
So	1900	1900	1900					1900	1900		1900	1900
Lanes	1	1	2	0	0	0	0	4	1	0	4	1
fW	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980					0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fLU	1.000	1.000	0.885					0.908	1.000		0.908	1.000
fRT		1.000	0.850					1.000	0.850		1.000	0.850
fLT	0.950	1.000						1.000			1.000	
Sec.												
fLpb	1.000	1.000						1.000			1.000	
fRpb		1.000	1.000					1.000	1.000		1.000	1.000
S	1770	1863	2803					6765	1583		6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	1523	1770	#	0.86	0.48	853	1.79
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.48	897	0.00
Right	R	697	2803		0.25	0.48	1350	0.52
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2866	6765	#	0.42	0.42	2847	1.01
Right	R	1042	1583		0.66	1.00	1583	0.66
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2787	6765		0.41	0.42	2847	0.98
Right	R	695	1583		0.44	1.00	1583	0.44

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.28
Total lost time per cycle, L = 11.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.42

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.79	0.48	31.1	1.000	853	0.50	358.2	0.0	389.3	F		
LTR	0.00	0.48	16.1	1.000	897	0.11	0.0	0.0	16.1	B	273.9	F
R	0.52	0.48	21.5	1.000	1350	0.12	0.3	0.0	21.8	C		
Westbound												
Northbound												
T	1.01	0.42	34.7	1.000	2847	0.50	18.5	0.0	53.2	D	39.3	D
R	0.66	1.00	0.0	0.950	1583	0.23	1.0	0.0	1.0	A		
Southbound												

T	0.98	0.42	34.2	1.000	2847	0.48	12.3	0.0	46.6	D	37.3	D
R	0.44	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 92.8 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	120.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	120.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	120.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	31.1	31.1	0.00	167.5	0.0	389.3

LTR	0.0	0.00	31.1	16.1	0.00	0.0	0.0	16.1
R	0.0	0.00	31.1	21.5	0.00	0.0	0.0	21.8
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	34.7	34.7	0.00	4.8	0.0	53.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.0
Southbound								
	0.0						0.0	
T	0.0	0.00	34.7	34.2	0.00	0.0	0.0	46.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 92.8 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	1523	0	393				789	1042		767	695	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	2	0	0	0	4	1	0	4	1	
SL	1770	1863	1584				1862	1583		1862	1583	
LnCapacity	853	897	762				783	1583		783	1583	
Flow Ratio	0.9	0.0	0.2				0.4	0.7		0.4	0.4	
v/c Ratio	1.79	0.00	0.52				1.01	0.66		0.98	0.44	
Grn Ratio	0.48	0.48	0.48				0.42	1.00		0.42	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	50.8	0.0	9.0				26.3			25.2		
kB	0.7	0.8	0.7				0.7	1.1		0.7	1.1	
Q2	85.4	0.0	0.7				8.7	2.0		7.3	0.8	
Q Average	136.2		0.0	9.8				35.0			32.5	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.2				1.1			1.1		
BOQ	150	0.0	11.5				40.0			37.2		
QSRatio												
85th Percentile Output:												
fB%	1.3	1.6	1.5				1.4			1.4		
BOQ	177	0.0	14.8				48.8			45.5		
QSRatio												
90th Percentile Output:												
fB%	1.4	1.8	1.6				1.5			1.5		
BOQ	191	0.0	16.1				51.5			48.1		
QSRatio												
95th Percentile Output:												
fB%	1.5	2.1	1.8				1.6			1.6		
BOQ	204	0.0	18.1				55.6			51.9		
QSRatio												
98th Percentile Output:												
fB%	1.7	2.7	2.2				1.8			1.8		
BOQ	232	0.0	21.2				61.9			57.9		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Volume				929		723		2087	219	221	1331	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	26.1	0.0			6.9	9.3	14.3	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1121	3437	0.87	0.33	33.1	C		
							32.5	C
R	914	2803	0.83	0.33	31.6	C		
Northbound								
T	2528	6765	0.87	0.37	26.8	C	25.9	C
R	1048	2803	0.22	0.37	17.2	B		
Southbound								
L	296	3437	0.79	0.09	49.0	D		
T	3552	6765	0.39	0.52	11.5	B	16.8	B

Intersection Delay = 25.3 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				929		723		2087	219	221	1331	
% Heavy Veh				2		2		2	2	2	2	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol				244		190		549	58	58	350	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	0	0		2	0	2	0	4	2		2	4	0
LGConfig				L			R		T	R	L		T	
Lane Width				12.0			12.0		12.0	12.0	12.0		12.0	
RTOR Vol							0			0				
Adj Flow				978			761		2197	231	233		1401	
%InSharedLn														
Prop LTs									0.000				0.000	
Prop RTs							1.000		0.000	1.000			0.000	
Peds Bikes	0				0				0					
Buses				0			0		0	0	0		0	
%InProtPhase														

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type				3		3		3	3	3	3	
Unit Ext.				3.0		3.0		3.0	3.0	3.0	3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g				2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	26.1	0.0			6.9	9.3	14.3	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				929		723		2087	219	221	1331	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow				978		761		2197	231	233	1401	
No. Lanes	0	0	0		2	0	2	0	4	2		2	4	0
Lane group				L			R		T	R	L		T	
Adj flow				978			761		2197	231	233		1401	
Prop LTs									0.000				0.000	
Prop RTs							1.000		0.000	1.000			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T	R	L	T		
So			1900		1900		1900	1900	1900	1900		
Lanes	0	0	2	0	2	0	4	2	2	4	0	
fW			1.000		1.000		1.000	1.000	1.000	1.000		
fHV			0.980		0.980		0.980	0.980	0.980	0.980		
fG			1.000		1.000		1.000	1.000	1.000	1.000		
fP			1.000		1.000		1.000	1.000	1.000	1.000		
fBB			1.000		1.000		1.000	1.000	1.000	1.000		
fA			1.000		1.000		1.000	1.000	1.000	1.000		
fLU			0.971		0.885		0.908	0.885	0.971	0.908		
fRT					0.850		1.000	0.850		1.000		
fLT			0.950				1.000		0.950	1.000		
Sec.												
fLpb			1.000				1.000		1.000	1.000		
fRpb					1.000		1.000	1.000		1.000		
S			3437		2803		6765	2803	3437	6765		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	978	3437	#	0.28	0.33	1121	0.87
Prot								
Perm								
Thru								
Right	R	761	2803		0.27	0.33	914	0.83
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2197	6765	#	0.32	0.37	2528	0.87
Right	R	231	2803		0.08	0.37	1048	0.22
Southbound								
Prot								
Perm								
Left	L	233	3437	#	0.07	0.09	296	0.79
Prot								
Perm								
Thru	T	1401	6765		0.21	0.52	3552	0.39
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.68
Total lost time per cycle, L = 17.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.86

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.87	0.33	25.4	1.000	1121	0.40	7.8	0.0	33.1	C		
											32.5	C
R	0.83	0.33	24.9	1.000	914	0.37	6.7	0.0	31.6	C		
Northbound												
T	0.87	0.37	23.2	1.000	2528	0.40	3.5	0.0	26.8	C	25.9	C
R	0.22	0.37	17.1	1.000	1048	0.11	0.1	0.0	17.2	B		
Southbound												
L	0.79	0.09	35.8	1.000	296	0.33	13.2	0.0	49.0	D		

T	0.39	0.52	11.4	1.000	3552	0.11	0.1	0.0	11.5	B	16.8	B

Intersection delay = 25.3 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	27.0	25.4	0.00	0.0	0.0	33.1
	0.0						0.0	
R	0.0	0.00	27.0	24.9	0.00	0.0	0.0	31.6
Northbound								
	0.0						0.0	
T	0.0	0.00	25.1	23.2	0.00	0.0	0.0	26.8
R	0.0	0.00	25.1	17.1	0.00	0.0	0.0	17.2
Southbound								
L	0.0	0.00	36.6	35.8	0.00	0.0	0.0	49.0
T	0.0	0.00	19.0	11.4	0.00	0.0	0.0	11.5
	0.0						0.0	

Intersection Delay 25.3 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup				L	R	T	R	L	T	
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate				503	429	604	130	119	385	
So				1900	1900	1900	1900	1900	1900	
No.Lanes	0	0	0	2	0 2	0 4	2	2	4	0
SL				1770	1584	1862	1584	1770	1862	
LnCapacity				577	516	696	592	152	977	
Flow Ratio				0.3	0.3	0.3	0.1	0.1	0.2	
v/c Ratio				0.87	0.83	0.87	0.22	0.78	0.39	
Grn Ratio				0.33	0.33	0.37	0.37	0.09	0.52	
I Factor				1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00	1.00	
Q1				10.5	8.8	12.4	2.0	2.6	5.1	
kB				0.5	0.4	0.5	0.5	0.2	0.6	
Q2				2.5	1.8	2.7	0.1	0.6	0.4	
Q Average				13.0	10.6	15.2	2.1	3.2	5.5	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage				0	0	0	0	0	0	
Q S Ratio										
70th Percentile Output:										
fB%				1.2	1.2	1.2	1.2	1.2	1.2	
BOQ				15.2	12.5	17.7	2.5	3.9	6.6	
QSRatio										
85th Percentile Output:										
fB%				1.5	1.5	1.5	1.6	1.6	1.5	
BOQ				19.4	16.1	22.5	3.3	5.1	8.6	
QSRatio										
90th Percentile Output:										
fB%				1.6	1.6	1.6	1.8	1.7	1.7	
BOQ				20.9	17.4	24.1	3.7	5.6	9.4	
QSRatio										
95th Percentile Output:										
fB%				1.8	1.8	1.8	2.0	2.0	1.9	
BOQ				23.3	19.5	26.7	4.3	6.5	10.7	
QSRatio										
98th Percentile Output:										
fB%				2.1	2.1	2.0	2.6	2.5	2.4	
BOQ				26.9	22.8	30.5	5.4	8.0	13.0	
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Volume				595		313		1957	908	622	1735	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	16.8	0.0			18.7	6.6	24.5	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	642	3437	0.98	0.19	65.6	E		
							55.5	E
R	523	2803	0.63	0.19	36.2	D		
Northbound								
T	2811	6765	0.73	0.42	23.1	C	24.7	C
R	1165	2803	0.82	0.42	28.1	C		
Southbound								
L	714	3437	0.92	0.21	51.7	D		
T	4608	6765	0.40	0.68	6.3	A	18.3	B

Intersection Delay = 26.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				595		313		1957	908	622	1735	
% Heavy Veh				2		2		2	2	2	2	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol				157		82		515	239	164	457	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			
Adj Flow				626		329		2060	956	655	1826	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000	0.000		
Peds Bikes	0			0			0					
Buses				0		0		0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type				3		3		3	3	3	3	
Unit Ext.				3.0		3.0		3.0	3.0	3.0	3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g				2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	16.8	0.0			18.7	6.6	24.5	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				595		313		1957	908	622	1735	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow				626		329		2060	956	655	1826	
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
Lane group				L		R		T	R	L	T	
Adj flow				626		329		2060	956	655	1826	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000	0.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		L	T	
So				1900		1900	1900	1900		1900	1900	
Lanes	0	0	0	2	0	2	0 4	2		2	4	0
fW				1.000		1.000	1.000	1.000		1.000	1.000	
fHV				0.980		0.980	0.980	0.980		0.980	0.980	
fG				1.000		1.000	1.000	1.000		1.000	1.000	
fP				1.000		1.000	1.000	1.000		1.000	1.000	
fBB				1.000		1.000	1.000	1.000		1.000	1.000	
fA				1.000		1.000	1.000	1.000		1.000	1.000	
fLU				0.971		0.885	0.908	0.885		0.971	0.908	
fRT						0.850	1.000	0.850			1.000	
fLT				0.950			1.000			0.950	1.000	
Sec.												
fLpb				1.000			1.000			1.000	1.000	
fRpb						1.000	1.000	1.000			1.000	
S				3437		2803	6765	2803		3437	6765	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	626	3437	#	0.18	0.19	642	0.98
Prot								
Perm								
Thru								
Right	R	329	2803		0.12	0.19	523	0.63
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2060	6765		0.30	0.42	2811	0.73
Right	R	956	2803	#	0.34	0.42	1165	0.82
Southbound								
Prot								
Perm								
Left	L	655	3437	#	0.19	0.21	714	0.92
Prot								
Perm								
Thru	T	1826	6765		0.27	0.68	4608	0.40
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.71
Total lost time per cycle, L = 17.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.88

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.98	0.19	36.4	1.000	642	0.48	29.2	0.0	65.6	E		
											55.5	E
R	0.63	0.19	33.7	1.000	523	0.21	2.4	0.0	36.2	D		
Northbound												
T	0.73	0.42	22.1	1.000	2811	0.29	1.0	0.0	23.1	C	24.7	C
R	0.82	0.42	23.3	1.000	1165	0.36	4.8	0.0	28.1	C		
Southbound												
L	0.92	0.21	34.9	1.000	714	0.44	16.8	0.0	51.7	D		

T	0.40	0.68	6.3	1.000	4608	0.11	0.1	0.0	6.3	A	18.3	B

Intersection delay = 26.8 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	90.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	36.6	36.4	0.00	0.0	0.0	65.6
	0.0						0.0	
R	0.0	0.00	36.6	33.7	0.00	0.0	0.0	36.2
Northbound								
	0.0						0.0	
T	0.0	0.00	26.3	22.1	0.00	0.0	0.0	23.1
R	0.0	0.00	26.3	23.3	0.00	0.0	0.0	28.1
Southbound								
L	0.0	0.00	35.7	34.9	0.00	0.0	0.0	51.7
T	0.0	0.00	14.3	6.3	0.00	0.0	0.0	6.3
	0.0						0.0	

Intersection Delay 26.8 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup				L	R	T	R	L	T	
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate				322	185	567	540	337	502	
So				1900	1900	1900	1900	1900	1900	
No.Lanes	0	0	0	2	0 2	0 4	2	2	4	0
SL				1770	1584	1862	1584	1770	1862	
LnCapacity				330	295	773	658	367	1268	
Flow Ratio				0.2	0.1	0.3	0.3	0.2	0.3	
v/c Ratio				0.98	0.63	0.73	0.82	0.92	0.40	
Grn Ratio				0.19	0.19	0.42	0.42	0.21	0.68	
I Factor				1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00	1.00	
Q1				8.0	4.3	11.9	12.0	8.2	5.5	
kB				0.4	0.3	0.6	0.5	0.4	0.8	
Q2				3.3	0.5	1.5	2.1	2.5	0.5	
Q Average				11.3	4.8	13.5	14.1	10.8	6.0	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage				0	0	0	0	0	0	
Q S Ratio										
70th Percentile Output:										
fB%				1.2	1.2	1.2	1.2	1.2	1.2	
BOQ				13.3	5.7	15.8	16.5	12.7	7.1	
QSRatio										
85th Percentile Output:										
fB%				1.5	1.6	1.5	1.5	1.5	1.5	
BOQ				17.0	7.5	20.1	21.0	16.3	9.3	
QSRatio										
90th Percentile Output:										
fB%				1.6	1.7	1.6	1.6	1.6	1.7	
BOQ				18.4	8.2	21.6	22.6	17.6	10.2	
QSRatio										
95th Percentile Output:										
fB%				1.8	2.0	1.8	1.8	1.8	1.9	
BOQ				20.6	9.4	24.0	25.0	19.7	11.6	
QSRatio										
98th Percentile Output:										
fB%				2.1	2.4	2.1	2.0	2.1	2.3	
BOQ				24.0	11.5	27.7	28.8	23.0	14.0	
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				997	290	1112		1144	353	234	1410	590
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
WB Left	A				SB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right	A	A	A	
Green	20.5	0.0				5.5	5.4	6.9	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1174	3437	0.89	0.34	27.7	C		
T	637	1863	0.48	0.34	16.1	B	14.3	B
R	1583	1583	0.74	1.00	1.9	A		
Northbound								
T	2075	6765	0.58	0.31	18.0	B	19.9	B
R	485	1583	0.77	0.31	26.1	C		
Southbound								
L	315	3437	0.78	0.09	38.6	D		
T	3146	6765	0.47	0.47	11.1	B	17.1	B
R	736	1583	0.84	0.47	23.0	C		

Intersection Delay = 16.7 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Macarthur at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				997	290	1112		1144	353	234	1410	590
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				262	76	293		301	93	62	371	155
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L		T	R		T	R	L		T	R
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0	
Adj Flow				1049	305	1171		1204	372	246	1484	621
%InSharedLn												
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0	0	0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	20.5	0.0				5.5	5.4	6.9	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				997	290	1112		1144	353	234	1410	590
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				1049	305	1171		1204	372	246	1484	621
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
Lane group				L		T	R		T	R	L		T	R
Adj flow				1049	305	1171		1204	372	246	1484	621
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	1049	3437		0.31	0.34	1174	0.89
Prot								
Perm								
Thru	T	305	1863		0.16	0.34	637	0.48
Right	R	1171	1583	#	0.74	1.00	1583	0.74
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1204	6765		0.18	0.31	2075	0.58
Right	R	372	1583		0.23	0.31	485	0.77
Southbound								
Prot								
Perm								
Left	L	246	3437		0.07	0.09	315	0.78
Prot								
Perm								
Thru	T	1484	6765		0.22	0.47	3146	0.47
Right	R	621	1583		0.39	0.47	736	0.84

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.74
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.74

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.89	0.34	18.7	1.000	1174	0.42	9.0	0.0	27.7	C		
T	0.48	0.34	15.5	1.000	637	0.11	0.6	0.0	16.1	B	14.3	B
R	0.74	1.00	0.0	0.950	1583	0.30	1.9	0.0	1.9	A		
Northbound												
T	0.58	0.31	17.5	1.000	2075	0.17	0.4	0.0	18.0	B	19.9	B
R	0.77	0.31	18.9	1.000	485	0.32	7.3	0.0	26.1	C		
Southbound												
L	0.78	0.09	26.7	1.000	315	0.33	12.0	0.0	38.6	D		

T	0.47	0.47	11.0	1.000	3146	0.11	0.1	0.0	11.1	B	17.1	B
R	0.84	0.47	14.1	1.000	736	0.38	8.9	0.0	23.0	C		

Intersection delay = 16.7 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

			EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach						
Cycle length, C	60.0	sec				
Total actual green time for LT lane group, G (s)						
Effective permitted green time for LT lane group, g(s)						
Opposing effective green time, go (s)						
Number of lanes in LT lane group, N						
Number of lanes in opposing approach, No						
Adjusted LT flow rate, VLT (veh/h)						
Proportion of LT in LT lane group, PLT						
Proportion of LT in opposing flow, PLTo						
Adjusted opposing flow rate, Vo (veh/h)						
Lost time for LT lane group, tL						
Computation						
LT volume per cycle, LTC=VLTC/3600						
Opposing lane util. factor, fLUo			1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)						
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g						
Opposing platoon ratio, Rpo (refer Exhibit 16-11)						
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]						
gq, (see Exhibit C16-4,5,6,7,8)						
gu=g-gq if gq>=gf, or = g-gf if gq<gf						
n=Max(gq-gf)/2,0)						
PTHo=1-PLTo						
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]						
EL1 (refer to Exhibit C16-3)						
EL2=Max((1-Ptho**n)/Plto, 1.0)						
fmin=2(1+PL)/g or fmin=2(1+Pl)/g						
gdiff=max(gq-gf,0)						
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)						
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**						
Left-turn adjustment, fLT						

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

			EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach						
Cycle length, C	60.0	sec				
Total actual green time for LT lane group, G (s)						
Effective permitted green time for LT lane group, g(s)						
Opposing effective green time, go (s)						
Number of lanes in LT lane group, N						
Number of lanes in opposing approach, No						
Adjusted LT flow rate, VLT (veh/h)						
Proportion of LT in LT lane group, PLT				0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo						
Adjusted opposing flow rate, Vo (veh/h)						
Lost time for LT lane group, tL						
Computation						
LT volume per cycle, LTC=VLTC/3600						
Opposing lane util. factor, fLUo			1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)						
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g						
Opposing platoon ratio, Rpo (refer Exhibit 16-11)						
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]						
gq, (see Exhibit C16-4,5,6,7,8)						
gu=g-gq if gq>=gf, or = g-gf if gq<gf						
n=Max(gq-gf)/2,0)						
PTHo=1-PLTo						
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]						
EL1 (refer to Exhibit C16-3)						

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.8	18.7	0.00	0.0	0.0	27.7
T	0.0	0.00	19.8	15.5	0.00	0.0	0.0	16.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.9
Northbound								
	0.0						0.0	
T	0.0	0.00	20.8	17.5	0.00	0.0	0.0	18.0
R	0.0	0.00	20.8	18.9	0.00	0.0	0.0	26.1
Southbound								
L	0.0	0.00	27.3	26.7	0.00	0.0	0.0	38.6
T	0.0	0.00	16.0	11.0	0.00	0.0	0.0	11.1
R	0.0	0.00	16.0	14.1	0.00	0.0	0.0	23.0

Intersection Delay 16.7 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound		
LaneGroup				L	T	R	T	R	L	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				540	305	1171	331	372	126	408	621
So				1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	1	1	4	1	2	4	1
SL				1770	1863	1583	1862	1583	1770	1862	1583
LnCapacity				604	637	1583	571	485	162	866	736
Flow Ratio				0.3	0.2	0.7	0.2	0.2	0.1	0.2	0.4
v/c Ratio				0.89	0.48	0.74	0.58	0.77	0.78	0.47	0.84
Grn Ratio				0.34	0.34	1.00	0.31	0.31	0.09	0.47	0.47
I Factor					1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1				8.5	4.0		4.7	5.6	2.1	4.7	9.1
kB				0.4	0.4	0.7	0.4	0.4	0.2	0.5	0.5
Q2				2.6	0.4	2.0	0.5	1.1	0.6	0.4	2.1
Q Average				11.1	4.4		5.2	6.7	2.6	5.1	11.2
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0	0
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2		1.2	1.2	1.2	1.2	1.2
BOQ				13.0	5.2		6.1	7.9	3.1	6.1	13.2
QSRatio											
85th Percentile Output:											
fB%				1.5	1.6		1.6	1.5	1.6	1.6	1.5
BOQ				16.7	6.8		8.0	10.3	4.1	7.9	16.9
QSRatio											
90th Percentile Output:											
fB%				1.6	1.7		1.7	1.7	1.8	1.7	1.6
BOQ				18.1	7.5		8.8	11.3	4.6	8.7	18.3
QSRatio											
95th Percentile Output:											
fB%				1.8	2.0		2.0	1.9	2.0	2.0	1.8
BOQ				20.2	8.6		10.1	12.8	5.3	9.9	20.5
QSRatio											
98th Percentile Output:											
fB%				2.1	2.4		2.4	2.3	2.5	2.4	2.1
BOQ				23.6	10.6		12.3	15.4	6.6	12.1	23.8
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				649	323	598		2186	696	606	1344	448
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	17.3	0.0				16.8	22.6	6.5	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 84.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	700	3437	0.98	0.20	61.5	E		
T	380	1863	0.89	0.20	55.7	E	37.0	D
R	1583	1583	0.40	1.00	0.2	A		
Northbound								
T	2805	6765	0.82	0.41	24.1	C	41.7	D
R	656	1583	1.12	0.41	96.8	F		
Southbound								
L	680	3437	0.94	0.20	54.3	D		
T	4462	6765	0.32	0.66	6.3	A	18.6	B
R	1044	1583	0.45	0.66	7.3	A		

Intersection Delay = 32.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Macarthur at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				649	323	598		2186	696	606	1344	448
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				171	85	157		575	183	159	354	118
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L		T	R		T	R	L		T	R
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0
Adj Flow				683	340	629		2301	733	638	1415	472
%InSharedLn												
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0	0	0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	17.3	0.0				16.8	22.6	6.5	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 84.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				649	323	598		2186	696	606	1344	448
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				683	340	629		2301	733	638	1415	472
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
Lane group				L		T	R		T	R	L		T	R
Adj flow				683	340	629		2301	733	638	1415	472
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	683	3437	#	0.20	0.20	700	0.98
Prot								
Perm								
Thru	T	340	1863		0.18	0.20	380	0.89
Right	R	629	1583		0.40	1.00	1583	0.40
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2301	6765		0.34	0.41	2805	0.82
Right	R	733	1583	#	0.46	0.41	656	1.12
Southbound								
Prot								
Perm								
Left	L	638	3437	#	0.19	0.20	680	0.94
Prot								
Perm								
Thru	T	1415	6765		0.21	0.66	4462	0.32
Right	R	472	1583		0.30	0.66	1044	0.45

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.85
Total lost time per cycle, L = 15.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.04

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.98	0.20	33.6	1.000	700	0.48	27.9	0.0	61.5	E		
T	0.89	0.20	32.9	1.000	380	0.42	22.7	0.0	55.7	E	37.0	D
R	0.40	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Northbound												
T	0.82	0.41	22.0	1.000	2805	0.36	2.1	0.0	24.1	C	41.7	D
R	1.12	0.41	24.9	1.000	656	0.50	72.0	0.0	96.8	F		
Southbound												
L	0.94	0.20	33.5	1.000	680	0.45	20.8	0.0	54.3	D		

T	0.32	0.66	6.2	1.000	4462	0.11	0.0	0.0	6.3	A	18.6	B
R	0.45	0.66	7.0	1.000	1044	0.11	0.3	0.0	7.3	A		

Intersection delay = 32.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	84.9 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	84.9 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	84.9 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	33.8	33.6	0.00	0.0	0.0	61.5
T	0.0	0.00	33.8	32.9	0.00	0.0	0.0	55.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Northbound								
	0.0						0.0	
T	0.0	0.00	24.9	22.0	0.00	0.0	0.0	24.1
R	0.0	0.00	24.9	24.9	0.00	19.2	0.0	96.8
Southbound								
L	0.0	0.00	34.1	33.5	0.00	0.0	0.0	54.3
T	0.0	0.00	14.5	6.2	0.00	0.0	0.0	6.3
R	0.0	0.00	14.5	7.0	0.00	0.0	0.0	7.3

Intersection Delay 32.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound		
LaneGroup				L	T	R	T	R	L	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				351	340	629	633	733	328	389	472
So				1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	1	1	4	1	2	4	1
SL				1770	1863	1583	1862	1583	1770	1862	1583
LnCapacity				360	380	1583	772	656	350	1228	1044
Flow Ratio				0.2	0.2	0.4	0.3	0.5	0.2	0.2	0.3
v/c Ratio				0.98	0.89	0.40	0.82	1.12	0.94	0.32	0.45
Grn Ratio				0.20	0.20	1.00	0.41	0.41	0.20	0.66	0.66
I Factor					1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1				8.2	7.8		13.2	17.3	7.6	3.9	5.4
kB				0.4	0.4	0.9	0.6	0.5	0.4	0.8	0.7
Q2				3.5	2.2	0.6	2.3	13.2	2.7	0.3	0.6
Q Average				11.7	10.0		15.5	30.5	10.3	4.3	6.0
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0	0
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2		1.2	1.1	1.2	1.2	1.2
BOQ				13.7	11.8		18.1	35.0	12.1	5.1	7.1
QSRatio											
85th Percentile Output:											
fB%				1.5	1.5		1.5	1.4	1.5	1.6	1.5
BOQ				17.6	15.2		23.0	43.0	15.6	6.7	9.2
QSRatio											
90th Percentile Output:											
fB%				1.6	1.6		1.6	1.5	1.6	1.7	1.7
BOQ				19.0	16.4		24.6	45.4	16.9	7.4	10.1
QSRatio											
95th Percentile Output:											
fB%				1.8	1.8		1.8	1.6	1.8	2.0	1.9
BOQ				21.2	18.5		27.2	49.1	18.9	8.5	11.5
QSRatio											
98th Percentile Output:											
fB%				2.1	2.2		2.0	1.8	2.2	2.4	2.3
BOQ				24.6	21.6		31.1	54.8	22.2	10.4	13.9
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 NB Ramps

Inter.: Baker at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
LGConfig	L	T			T	R	L	LTR				
Volume	680	2029			268	181	394	420	606			
Lane Width	12.0	12.0			12.0	12.0	12.0	12.0				
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	32.4	6.8	14.3	0.0		32.8	0.0	
Yellow	3.2	4.0	4.0			3.5		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 105.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1061	3437	0.67	0.31	33.4	C		
T	2118	3547	1.01	0.60	42.8	D	40.4	D
Westbound								
T	882	3547	0.32	0.25	32.4	C	33.3	C
R	393	1583	0.49	0.25	34.7	C		
Northbound								
L	553	1770	0.75	0.31	38.1	D		
LTR	1010	3232	1.07	0.31	84.9	F	71.9	E
Southbound								

Intersection Delay = 49.5 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Baker at SR-55 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 NB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	680	2029			268	181	394	420	606			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	179	534			71	48	104	111	159			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900	1900	1900				
ParkExist												
NumPark												
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
LGConfig	L	T			T	R	L	LTR				
Lane Width	12.0	12.0			12.0	12.0	12.0	12.0				
RTOR Vol					0			0				
Adj Flow	716	2136			282	191	415	1080				
%InSharedLn							0					
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000			0.000	1.000		0.591				
Peds Bikes					0			0			0	
Buses	0	0			0	0	0	0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0	0.0	0.0				
Arriv. Type	3	3			3	3	3	3				
Unit Ext.	3.0	3.0			3.0	3.0	3.0	3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0	2.0	2.0				
Ext of g	2.0	2.0			2.0	2.0	2.0	2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	32.4	6.8	14.3	0.0		32.8	0.0		
Yellow	3.2	4.0	4.0			3.5			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 105.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	680	2029			268	181	394	420	606			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	716	2136			282	191	415	442	638			
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
Lane group	L	T			T	R	L	LTR				
Adj flow	716	2136			282	191	415	1080				
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000			0.000	1.000		0.591				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound		Northbound		Southbound			
LG	L	T			T	R	L	LTR				
So	1900	1900			1900	1900	1900	1900				
Lanes	2	2	0	0	2	1	1	2	0	0	0	0
fW	1.000	1.000			1.000	1.000	1.000	1.000				
fHV	0.980	0.980			0.980	0.980	0.980	0.980				
fG	1.000	1.000			1.000	1.000	1.000	1.000				
fP	1.000	1.000			1.000	1.000	1.000	1.000				
fBB	1.000	1.000			1.000	1.000	1.000	1.000				
fA	1.000	1.000			1.000	1.000	1.000	1.000				
fLU	0.971	0.952			0.952	1.000	1.000	0.952				
fRT		1.000			1.000	0.850		0.911				
fLT	0.950	1.000			1.000		0.950	1.000				
Sec.												
fLpb	1.000	1.000			1.000		1.000	1.000				
fRpb		1.000			1.000	1.000		1.000				
S	3437	3547			3547	1583	1770	3232				
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	716	3437		0.21	0.31	1061	0.67
Prot								
Perm								
Thru	T	2136	3547	#	0.60	0.60	2118	1.01
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	282	3547		0.08	0.25	882	0.32
Right	R	191	1583		0.12	0.25	393	0.49
Northbound								
Prot								
Perm								
Left	L	415	1770		0.23	0.31	553	0.75
Prot								
Perm								
Thru	LTR	1080	3232	#	0.33	0.31	1010	1.07
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.94
Total lost time per cycle, L = 9.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.03

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.67	0.31	31.7	1.000	1061	0.25	1.7	0.0	33.4	C		
T	1.01	0.60	21.2	1.000	2118	0.50	21.6	0.0	42.8	D	40.4	D
Westbound												
T	0.32	0.25	32.2	1.000	882	0.11	0.2	0.0	32.4	C	33.3	C
R	0.49	0.25	33.7	1.000	393	0.11	0.9	0.0	34.7	C		
Northbound												
L	0.75	0.31	32.4	1.000	553	0.31	5.7	0.0	38.1	D		
LTR	1.07	0.31	36.1	1.000	1010	0.50	48.8	0.0	84.9	F	71.9	E
Southbound												

Intersection delay = 49.5 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 105.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 105.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				

EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 105.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

L	0.0	0.00	36.3	31.7	0.00	0.0	0.0	33.4
T	0.0	0.00	21.2	21.2	0.00	4.5	0.0	42.8
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	39.5	32.2	0.00	0.0	0.0	32.4
R	0.0	0.00	39.5	33.7	0.00	0.0	0.0	34.7
Northbound								
L	0.0	0.00	36.1	32.4	0.00	0.0	0.0	38.1
LTR	0.0	0.00	36.1	36.1	0.00	17.5	0.0	84.9
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 49.5 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound			Southbound		
LaneGroup	L	T		T	R	L	LTR				
Init Queue	0.0	0.0		0.0	0.0	0.0	0.0				
Flow Rate	368	1121		148	191	415	567				
So	1900	1900		1900	1900	1900	1900				
No.Lanes	2	2	0	0 2	1	1	2	0	0	0	0
SL	1770	1862		1862	1583	1770	1697				
LnCapacity	546	1112		463	393	553	530				
Flow Ratio	0.2	0.6		0.1	0.1	0.2	0.3				
v/c Ratio	0.67	1.01		0.32	0.49	0.75	1.07				
Grn Ratio	0.31	0.60		0.25	0.25	0.31	0.31				
I Factor		1.000		1.000			1.000				
AT or PVG	3	3		3	3	3	3				
Pltn Ratio	1.00	1.00		1.00	1.00	1.00	1.00				
PF2	1.00	1.00		1.00	1.00	1.00	1.00				
Q1	9.4	32.7		3.5	4.8	10.9	16.5				
kB	0.5	0.8		0.5	0.4	0.5	0.5				
Q2	1.0	11.2		0.2	0.4	1.5	8.8				
Q Average	10.4	43.9		3.7	5.2	12.3	25.3				
Q Spacing	25.0	25.0		25.0	25.0	25.0	25.0				
Q Storage	0	0		0	0	0	0				
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.1		1.2	1.2	1.2	1.2				
BOQ	12.3	49.8		4.5	6.1	14.5	29.2				
QSRatio											
85th Percentile Output:											
fB%	1.5	1.4		1.6	1.6	1.5	1.4				
BOQ	15.7	60.1		5.9	8.0	18.5	36.2				
QSRatio											
90th Percentile Output:											
fB%	1.6	1.4		1.7	1.7	1.6	1.5				
BOQ	17.0	63.4		6.5	8.8	19.9	38.3				
QSRatio											
95th Percentile Output:											
fB%	1.8	1.6		2.0	2.0	1.8	1.6				
BOQ	19.1	68.2		7.4	10.1	22.2	41.7				
QSRatio											
98th Percentile Output:											
fB%	2.1	1.7		2.4	2.4	2.1	1.8				
BOQ	22.4	76.1		9.2	12.2	25.8	46.7				
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 NB Ramps

Inter.: Baker at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
LGConfig	L	T			T	R	L	LTR				
Volume	321	670			1413	635	367	444	490			
Lane Width	12.0	12.0			12.0	12.0	12.0	12.0				
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	8.6	10.7	24.0	0.0		28.0	0.0	
Yellow	3.2	4.0	4.0			3.5		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	328	3437	1.03	0.10	98.5	F		
T	2069	3547	0.34	0.58	9.8	A	38.6	D
Westbound								
T	1565	3547	0.95	0.44	37.1	D	40.5	D
R	698	1583	0.96	0.44	48.3	D		
Northbound								
L	551	1770	0.70	0.31	31.3	C		
LTR	1016	3267	0.97	0.31	51.3	D	45.6	D
Southbound								

Intersection Delay = 41.6 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Baker at SR-55 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 NB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	321	670			1413	635	367	444	490			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	84	176			372	167	97	117	129			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900	1900	1900				
ParkExist												
NumPark												
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
LGConfig	L	T			T	R	L		LTR			
Lane Width	12.0	12.0			12.0	12.0	12.0	12.0				
RTOR Vol					0				0			
Adj Flow	338	705			1487	668	386	983				
%InSharedLn							0					
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000			0.000	1.000		0.525				
Peds Bikes					0			0			0	
Buses	0	0			0	0	0	0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0	0.0	0.0				
Arriv. Type	3	3			3	3	3	3				
Unit Ext.	3.0	3.0			3.0	3.0	3.0	3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0	2.0	2.0				
Ext of g	2.0	2.0			2.0	2.0	2.0	2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	8.6	10.7	24.0	0.0		28.0	0.0	
Yellow	3.2	4.0	4.0			3.5		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	321	670			1413	635	367	444	490			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	338	705			1487	668	386	467	516			
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
Lane group	L	T			T	R	L		LTR			
Adj flow	338	705			1487	668	386	983				
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000			0.000	1.000		0.525				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound		Northbound		Southbound			
LG	L	T			T	R	L	LTR				
So	1900	1900			1900	1900	1900	1900				
Lanes	2	2	0	0	2	1	1	2	0	0	0	0
fW	1.000	1.000			1.000	1.000	1.000	1.000				
fHV	0.980	0.980			0.980	0.980	0.980	0.980				
fG	1.000	1.000			1.000	1.000	1.000	1.000				
fP	1.000	1.000			1.000	1.000	1.000	1.000				
fBB	1.000	1.000			1.000	1.000	1.000	1.000				
fA	1.000	1.000			1.000	1.000	1.000	1.000				
fLU	0.971	0.952			0.952	1.000	1.000	0.952				
fRT		1.000			1.000	0.850		0.921				
fLT	0.950	1.000			1.000		0.950	1.000				
Sec.												
fLpb	1.000	1.000			1.000		1.000	1.000				
fRpb		1.000			1.000	1.000		1.000				
S	3437	3547			3547	1583	1770	3267				
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	338	3437	#	0.10	0.10	328	1.03
Prot								
Perm								
Thru	T	705	3547		0.20	0.58	2069	0.34
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1487	3547		0.42	0.44	1565	0.95
Right	R	668	1583	#	0.42	0.44	698	0.96
Northbound								
Prot								
Perm								
Left	L	386	1770		0.22	0.31	551	0.70
Prot								
Perm								
Thru	LTR	983	3267	#	0.30	0.31	1016	0.97
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.82
Total lost time per cycle, L = 13.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.97

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.03	0.10	40.7	1.000	328	0.50	57.8	0.0	98.5	F		
T	0.34	0.58	9.8	1.000	2069	0.11	0.1	0.0	9.8	A	38.6	D
Westbound												
T	0.95	0.44	24.2	1.000	1565	0.46	12.9	0.0	37.1	D	40.5	D
R	0.96	0.44	24.3	1.000	698	0.47	23.9	0.0	48.3	D		
Northbound												
L	0.70	0.31	27.3	1.000	551	0.27	4.0	0.0	31.3	C		
LTR	0.97	0.31	30.6	1.000	1016	0.47	20.7	0.0	51.3	D	45.6	D
Southbound												

Intersection delay = 41.6 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	90.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	40.7	40.7	0.00	2.5	0.0	98.5

T	0.0	0.00	18.8	9.8	0.00	0.0	0.0	9.8
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	25.1	24.2	0.00	0.0	0.0	37.1
R	0.0	0.00	25.1	24.3	0.00	0.0	0.0	48.3
Northbound								
L	0.0	0.00	31.0	27.3	0.00	0.0	0.0	31.3
LTR	0.0	0.00	31.0	30.6	0.00	0.0	0.0	51.3
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 41.6 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound			Southbound		
LaneGroup	L	T		T	R	L	LTR				
Init Queue	0.0	0.0		0.0	0.0	0.0	0.0				
Flow Rate	174	370		780	668	386	516				
So	1900	1900		1900	1900	1900	1900				
No.Lanes	2	2	0	0 2	1	1	2	0	0	0	0
SL	1770	1862		1862	1583	1770	1715				
LnCapacity	168	1086		821	698	551	533				
Flow Ratio	0.1	0.2		0.4	0.4	0.2	0.3				
v/c Ratio	1.04	0.34		0.95	0.96	0.70	0.97				
Grn Ratio	0.10	0.58		0.44	0.44	0.31	0.31				
I Factor		1.000		1.000			1.000				
AT or PVG	3	3		3	3	3	3				
Pltn Ratio	1.00	1.00		1.00	1.00	1.00	1.00				
PF2	1.00	1.00		1.00	1.00	1.00	1.00				
Q1	4.3	4.8		18.8	16.2	8.5	12.7				
kB	0.2	0.7		0.6	0.6	0.5	0.5				
Q2	2.7	0.4		5.6	5.2	1.1	4.6				
Q Average	7.0	5.2		24.3	21.3	9.6	17.3				
Q Spacing	25.0	25.0		25.0	25.0	25.0	25.0				
Q Storage	0	0		0	0	0	0				
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2		1.2	1.2	1.2	1.2				
BOQ	8.3	6.2		28.1	24.7	11.3	20.1				
QSRatio											
85th Percentile Output:											
fB%	1.5	1.6		1.4	1.4	1.5	1.5				
BOQ	10.8	8.0		34.9	30.9	14.5	25.4				
QSRatio											
90th Percentile Output:											
fB%	1.7	1.7		1.5	1.5	1.6	1.6				
BOQ	11.8	8.9		37.0	32.8	15.8	27.1				
QSRatio											
95th Percentile Output:											
fB%	1.9	1.9		1.7	1.7	1.9	1.7				
BOQ	13.4	10.1		40.3	35.9	17.7	29.9				
QSRatio											
98th Percentile Output:											
fB%	2.3	2.4		1.9	1.9	2.2	2.0				
BOQ	16.0	12.3		45.1	40.4	20.9	34.0				
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 SB Ramps

Inter.: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
LGConfig		TR	R	L	T						LT	R
Volume		1924	262	98	486					826	150	214
Lane Width		12.0	12.0	12.0	12.0						12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	6.0	45.5	22.6	0.0		37.6	0.0	
Yellow	3.0	4.0	4.0			3.3		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 130.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	1995	3547	1.02	0.56	52.4	D	48.0	D
R	890	1583	0.31	0.56	15.3	B		
Westbound								
L	82	1770	1.26	0.05	245.0	F		
T	2267	3547	0.23	0.64	9.9	A	49.3	D
Northbound								
Southbound								
LT	984	3403	1.04	0.29	86.9	F	78.4	E
R	458	1583	0.49	0.29	39.1	D		

Intersection Delay = 57.3 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Baker at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 SB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1924	262	98	486					826	150	214
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		506	69	26	128					217	39	56
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900	1900	1900						1900	1900
ParkExist												
NumPark												
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
LGConfig		TR	R	L	T						LT	R
Lane Width		12.0	12.0	12.0	12.0						12.0	12.0
RTOR Vol			0									0
Adj Flow		2025	276	103	512						1027	225
%InSharedLn			0									
Prop LTs		0.000			0.000						0.846	
Prop RTs		0.000	1.000		0.000						0.000	1.000
Peds Bikes	0						0			0		
Buses		0	0	0	0						0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0	0.0	0.0						0.0	0.0
Arriv. Type		3	3	3	3						3	3
Unit Ext.		3.0	3.0	3.0	3.0						3.0	3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0	2.0	2.0						2.0	2.0
Ext of g		2.0	2.0	2.0	2.0						2.0	2.0
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	6.0	45.5	22.6	0.0		37.6	0.0	
Yellow	3.0	4.0	4.0			3.3		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 130.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1924	262	98	486					826	150	214
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		2025	276	103	512					869	158	225
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
Lane group		TR	R	L	T						LT	R
Adj flow		2025	276	103	512						1027	225
Prop LTs		0.000			0.000						0.846	
Prop RTs		0.000	1.000		0.000						0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound				Northbound				Southbound			
LG		TR	R		L		T							LT	R	
So		1900	1900		1900		1900							1900	1900	
Lanes	0	2	1		1		2	0	0	0	0	0		2	1	
fW		1.000	1.000		1.000		1.000							1.000	1.000	
fHV		0.980	0.980		0.980		0.980							0.980	0.980	
fG		1.000	1.000		1.000		1.000							1.000	1.000	
fP		1.000	1.000		1.000		1.000							1.000	1.000	
fBB		1.000	1.000		1.000		1.000							1.000	1.000	
fA		1.000	1.000		1.000		1.000							1.000	1.000	
fLU		0.952	1.000		1.000		0.952							0.952	1.000	
fRT		1.000	0.850				1.000							1.000	0.850	
fLT		1.000			0.950		1.000							0.959		
Sec.																
fLpb		1.000			1.000		1.000							1.000		
fRpb		1.000	1.000				1.000							1.000	1.000	
S		3547	1583		1770		3547							3403	1583	
Sec.																

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	2025	3547	#	0.57	0.56	1995	1.02
Right	R	276	1583		0.17	0.56	890	0.31
Westbound								
Prot								
Perm								
Left	L	103	1770	#	0.06	0.05	82	1.26
Prot								
Perm								
Thru	T	512	3547		0.14	0.64	2267	0.23
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	1027	3403	#	0.30	0.29	984	1.04
Right	R	225	1583		0.14	0.29	458	0.49

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.93
Total lost time per cycle, L = 13.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.04

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	1.02	0.56	28.5	1.000	1995	0.50	24.0	0.0	52.4	D	48.0	D
R	0.31	0.56	15.1	1.000	890	0.11	0.2	0.0	15.3	B		
Westbound												
L	1.26	0.05	62.0	1.000	82	0.50	183.0	0.0	245.0	F		
T	0.23	0.64	9.9	1.000	2267	0.11	0.1	0.0	9.9	A	49.3	D
Northbound												
Southbound												

LT	1.04	0.29	46.2	1.000	984	0.50	40.7	0.0	86.9	F	78.4 E
R	0.49	0.29	38.3	1.000	458	0.11	0.8	0.0	39.1	D	

Intersection delay = 57.3 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	130.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	130.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000	0.000		0.846
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	130.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	28.5	28.5	0.00	7.5	0.0	52.4
R	0.0	0.00	28.5	15.1	0.00	0.0	0.0	15.3
Westbound								
L	0.0	0.00	62.0	62.0	0.00	5.3	0.0	245.0
T	0.0	0.00	23.5	9.9	0.00	0.0	0.0	9.9
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LT	0.0	0.00	46.2	46.2	0.00	10.7	0.0	86.9
R	0.0	0.00	46.2	38.3	0.00	0.0	0.0	39.1

Intersection Delay 57.3 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound			Southbound	
LaneGroup	TR	R	L	T					LT	R
Init Queue	0.0	0.0	0.0	0.0					0.0	0.0
Flow Rate	1063	276	103	268					539	225
So	1900	1900	1900	1900					1900	1900
No.Lanes	0 2	1	1	2	0	0 0	0		0 2	1
SL	1862	1583	1770	1862					1787	1583
LnCapacity	1047	890	82	1190					516	458
Flow Ratio	0.6	0.2	0.1	0.1					0.3	0.1
v/c Ratio	1.02	0.31	1.26	0.23					1.04	0.49
Grn Ratio	0.56	0.56	0.05	0.64					0.29	0.29
I Factor	1.000			1.000					1.000	
AT or PVG	3	3	3	3					3	3
Pltn Ratio	1.00	1.00	1.00	1.00					1.00	1.00
PF2	1.00	1.00	1.00	1.00					1.00	1.00
Q1	38.4	5.3	3.7	4.1					19.5	6.7
kB	0.9	0.8	0.2	1.0					0.6	0.5
Q2	11.9	0.4	3.4	0.3					7.8	0.5
Q Average	50.3	5.6	7.1	4.4					27.3	7.2
Q Spacing	25.0	25.0	25.0	25.0					25.0	25.0
Q Storage	0	0	0	0					0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.1	1.2	1.2	1.2					1.2	1.2
BOQ	56.7	6.7	8.4	5.2					31.4	8.6
QSRatio										
85th Percentile Output:										
fB%	1.4	1.5	1.5	1.6					1.4	1.5
BOQ	68.2	8.7	10.9	6.8					38.8	11.1
QSRatio										
90th Percentile Output:										
fB%	1.4	1.7	1.7	1.7					1.5	1.7
BOQ	72.0	9.6	11.9	7.5					41.0	12.2
QSRatio										
95th Percentile Output:										
fB%	1.5	1.9	1.9	2.0					1.6	1.9
BOQ	77.3	10.9	13.5	8.6					44.6	13.8
QSRatio										
98th Percentile Output:										
fB%	1.7	2.3	2.3	2.4					1.8	2.3
BOQ	86.5	13.2	16.1	10.5					49.8	16.5
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 SB Ramps

Inter.: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
LGConfig		TR	R	L	T						LT	R
Volume		799	532	349	1389					271	368	501
Lane Width		12.0	12.0	12.0	12.0						12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	17.3	21.0	8.7	0.0	29.7	0.0		
Yellow	3.0	4.0	4.0		3.3			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	1296	3547	0.65	0.37	26.2	C	39.4	D
R	578	1583	0.97	0.37	59.2	E		
Westbound								
L	322	1770	1.14	0.18	132.4	F		
T	2091	3547	0.70	0.59	14.7	B	38.3	D
Northbound								
Southbound								
LT	1086	3473	0.62	0.31	28.9	C	56.4	E
R	495	1583	1.06	0.31	91.4	F		

Intersection Delay = 43.5 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Baker at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 SB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		799	532	349	1389					271	368	501
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		210	140	92	366					71	97	132
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900	1900	1900						1900	1900
ParkExist												
NumPark												
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
LGConfig		TR	R	L	T						LT	R
Lane Width		12.0	12.0	12.0	12.0						12.0	12.0
RTOR Vol			0									0
Adj Flow		841	560	367	1462						672	527
%InSharedLn			0									
Prop LTs		0.000			0.000						0.424	
Prop RTs		0.000	1.000		0.000						0.000	1.000
Peds Bikes		0						0			0	
Buses		0	0	0	0						0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0	0.0	0.0						0.0	0.0
Arriv. Type		3	3	3	3						3	3
Unit Ext.		3.0	3.0	3.0	3.0						3.0	3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0	2.0	2.0						2.0	2.0
Ext of g		2.0	2.0	2.0	2.0						2.0	2.0
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	17.3	21.0	8.7	0.0		29.7	0.0	
Yellow	3.0	4.0	4.0			3.3		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		799	532	349	1389					271	368	501
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		841	560	367	1462					285	387	527
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
Lane group		TR	R	L	T						LT	R
Adj flow		841	560	367	1462						672	527
Prop LTs		0.000			0.000						0.424	
Prop RTs		0.000	1.000		0.000						0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound				Northbound				Southbound			
LG		TR	R	L	T								LT	R		
So		1900	1900	1900	1900								1900	1900		
Lanes	0	2	1	1	2	0	0	0	0	0	0	0	2	1		
fW		1.000	1.000	1.000	1.000								1.000	1.000		
fHV		0.980	0.980	0.980	0.980								0.980	0.980		
fG		1.000	1.000	1.000	1.000								1.000	1.000		
fP		1.000	1.000	1.000	1.000								1.000	1.000		
fBB		1.000	1.000	1.000	1.000								1.000	1.000		
fA		1.000	1.000	1.000	1.000								1.000	1.000		
fLU		0.952	1.000	1.000	0.952								0.952	1.000		
fRT		1.000	0.850		1.000								1.000	0.850		
fLT		1.000		0.950	1.000								0.979			
Sec.																
fLpb		1.000		1.000	1.000								1.000			
fRpb		1.000	1.000		1.000								1.000	1.000		
S		3547	1583	1770	3547								3473	1583		
Sec.																

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	841	3547		0.24	0.37	1296	0.65
Right	R	560	1583	#	0.35	0.37	578	0.97
Westbound								
Prot								
Perm								
Left	L	367	1770	#	0.21	0.18	322	1.14
Prot								
Perm								
Thru	T	1462	3547		0.41	0.59	2091	0.70
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	672	3473		0.19	0.31	1086	0.62
Right	R	527	1583	#	0.33	0.31	495	1.06

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.89
Total lost time per cycle, L = 13.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.04

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	0.65	0.37	25.1	1.000	1296	0.23	1.2	0.0	26.2	C	39.4	D
R	0.97	0.37	29.6	1.000	578	0.48	29.6	0.0	59.2	E		
Westbound												
L	1.14	0.18	38.8	1.000	322	0.50	93.5	0.0	132.4	F		
T	0.70	0.59	13.6	1.000	2091	0.27	1.1	0.0	14.7	B	38.3	D
Northbound												
Southbound												

LT	0.62	0.31	27.8	1.000	1086	0.20	1.1	0.0	28.9	C	56.4	E
R	1.06	0.31	32.7	1.000	495	0.50	58.7	0.0	91.4	F		

Intersection delay = 43.5 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.424
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	30.1	25.1	0.00	0.0	0.0	26.2
R	0.0	0.00	30.1	29.6	0.00	0.0	0.0	59.2
Westbound								
L	0.0	0.00	38.8	38.8	0.00	11.3	0.0	132.4
T	0.0	0.00	19.5	13.6	0.00	0.0	0.0	14.7
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LT	0.0	0.00	32.7	27.8	0.00	0.0	0.0	28.9
R	0.0	0.00	32.7	32.7	0.00	8.0	0.0	91.4

Intersection Delay 43.5 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound			Southbound	
LaneGroup	TR	R	L	T					LT	R
Init Queue	0.0	0.0	0.0	0.0					0.0	0.0
Flow Rate	441	560	367	767					352	527
So	1900	1900	1900	1900					1900	1900
No.Lanes	0 2	1	1	2	0	0	0	0	2	1
SL	1862	1583	1770	1862					1824	1583
LnCapacity	680	578	322	1098					570	495
Flow Ratio	0.2	0.4	0.2	0.4					0.2	0.3
v/c Ratio	0.65	0.97	1.14	0.70					0.62	1.06
Grn Ratio	0.37	0.37	0.18	0.59					0.31	0.31
I Factor	1.000			1.000					1.000	
AT or PVG	3	3	3	3					3	3
Pltn Ratio	1.00	1.00	1.00	1.00					1.00	1.00
PF2	1.00	1.00	1.00	1.00					1.00	1.00
Q1	9.7	14.5	9.7	14.1					7.9	13.9
kB	0.6	0.5	0.4	0.8					0.5	0.5
Q2	1.0	5.0	7.8	1.7					0.8	7.9
Q Average	10.7	19.5	17.4	15.8					8.7	21.8
Q Spacing	25.0	25.0	25.0	25.0					25.0	25.0
Q Storage	0	0	0	0					0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2	1.2	1.2					1.2	1.2
BOQ	12.6	22.6	20.3	18.4					10.3	25.2
QSRatio										
85th Percentile Output:										
fB%	1.5	1.5	1.5	1.5					1.5	1.4
BOQ	16.1	28.4	25.6	23.3					13.3	31.5
QSRatio										
90th Percentile Output:										
fB%	1.6	1.6	1.6	1.6					1.7	1.5
BOQ	17.5	30.2	27.3	25.0					14.4	33.5
QSRatio										
95th Percentile Output:										
fB%	1.8	1.7	1.7	1.7					1.9	1.7
BOQ	19.6	33.2	30.1	27.6					16.3	36.6
QSRatio										
98th Percentile Output:										
fB%	2.1	1.9	2.0	2.0					2.2	1.9
BOQ	22.9	37.5	34.2	31.6					19.3	41.1
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 NB Ramps

Inter.: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
LGConfig	L	T			T	R		LT	R			
Volume	271	1643			222	256	118	743	277			
Lane Width	12.0	12.0			12.0	12.0		12.0	12.0			
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	14.4	5.9	6.2	0.0		19.3	0.0		
Yellow	3.6	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	392	1770	0.73	0.22	30.1	C		
T	1970	3547	0.88	0.56	17.4	B	19.2	B
Westbound								
T	933	3547	0.25	0.26	19.0	B	22.1	C
R	416	1583	0.65	0.26	24.7	C		
Northbound								
LT	1046	3523	0.87	0.30	29.4	C	27.7	C
R	470	1583	0.62	0.30	22.2	C		
Southbound								

Intersection Delay = 22.3 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 NB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	271	1643			222	256	118	743	277			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	71	432			58	67	31	196	73			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900		1900	1900			
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
LGConfig	L	T			T	R		LT	R			
Lane Width	12.0	12.0			12.0	12.0		12.0	12.0			
RTOR Vol					0				0			
Adj Flow	285	1729			234	269		906	292			
%InSharedLn												
Prop LTs		0.000			0.000			0.137				
Prop RTs		0.000			0.000	1.000		0.000	1.000			
Peds Bikes					0			0			0	
Buses	0	0			0	0		0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0		0.0	0.0			
Arriv. Type	3	3			3	3		3	3			
Unit Ext.	3.0	3.0			3.0	3.0		3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0		2.0	2.0			
Ext of g	2.0	2.0			2.0	2.0		2.0	2.0			
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	14.4	5.9	6.2	0.0		19.3	0.0	
Yellow	3.6	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	271	1643			222	256	118	743	277			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	285	1729			234	269	124	782	292			
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
Lane group	L	T			T	R		LT	R			
Adj flow	285	1729			234	269		906	292			
Prop LTs		0.000			0.000			0.137				
Prop RTs		0.000			0.000	1.000		0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound			Northbound			Southbound		
LG	L	T			T	R		LT	R				
So	1900	1900			1900	1900		1900	1900				
Lanes	1	2	0	0	2	1	0	2	1	0	0	0	
fW	1.000	1.000			1.000	1.000		1.000	1.000				
fHV	0.980	0.980			0.980	0.980		0.980	0.980				
fG	1.000	1.000			1.000	1.000		1.000	1.000				
fP	1.000	1.000			1.000	1.000		1.000	1.000				
fBB	1.000	1.000			1.000	1.000		1.000	1.000				
fA	1.000	1.000			1.000	1.000		1.000	1.000				
fLU	1.000	0.952			0.952	1.000		0.952	1.000				
fRT		1.000			1.000	0.850		1.000	0.850				
fLT	0.950	1.000			1.000			0.993					
Sec.													
fLpb	1.000	1.000			1.000			1.000					
fRpb		1.000			1.000	1.000		1.000	1.000				
S	1770	3547			3547	1583		3523	1583				
Sec.													

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	285	1770		0.16	0.22	392	0.73
Prot								
Perm								
Thru	T	1729	3547	#	0.49	0.56	1970	0.88
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	234	3547		0.07	0.26	933	0.25
Right	R	269	1583		0.17	0.26	416	0.65
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	906	3523	#	0.26	0.30	1046	0.87
Right	R	292	1583		0.18	0.30	470	0.62
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.74
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.87

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.73	0.22	23.5	1.000	392	0.29	6.7	0.0	30.1	C		
T	0.88	0.56	12.5	1.000	1970	0.40	4.9	0.0	17.4	B	19.2	B
Westbound												
T	0.25	0.26	18.9	1.000	933	0.11	0.1	0.0	19.0	B	22.1	C
R	0.65	0.26	21.3	1.000	416	0.22	3.5	0.0	24.7	C		
Northbound												
LT	0.87	0.30	21.6	1.000	1046	0.40	7.8	0.0	29.4	C	27.7	C
R	0.62	0.30	19.7	1.000	470	0.20	2.5	0.0	22.2	C		
Southbound												

Intersection delay = 22.3 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.137	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	25.3	23.5	0.00	0.0	0.0	30.1

T	0.0	0.00	14.5	12.5	0.00	0.0	0.0	17.4
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	24.0	18.9	0.00	0.0	0.0	19.0
R	0.0	0.00	24.0	21.3	0.00	0.0	0.0	24.7
Northbound								
	0.0						0.0	
LT	0.0	0.00	22.9	21.6	0.00	0.0	0.0	29.4
R	0.0	0.00	22.9	19.7	0.00	0.0	0.0	22.2
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 22.3 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup	L	T		T	R	LT	R			
Init Queue	0.0	0.0		0.0	0.0	0.0	0.0			
Flow Rate	285	908		122	269	475	292			
So	1900	1900		1900	1900	1900	1900			
No.Lanes	1	2	0	0	2	1	0	2	1	0	0	0
SL	1770	1862		1862	1583	1850	1583			
LnCapacity	392	1034		490	416	549	470			
Flow Ratio	0.2	0.5		0.1	0.2	0.3	0.2			
v/c Ratio	0.73	0.88		0.25	0.65	0.87	0.62			
Grn Ratio	0.22	0.56		0.26	0.26	0.30	0.30			
I Factor		1.000		1.000		1.000				
AT or PVG	3	3		3	3	3	3			
Pltn Ratio	1.00	1.00		1.00	1.00	1.00	1.00			
PF2	1.00	1.00		1.00	1.00	1.00	1.00			
Q1	4.8	14.2		1.7	4.3	8.1	4.5			
kB	0.3	0.6		0.4	0.3	0.4	0.4			
Q2	0.8	3.4		0.1	0.6	2.1	0.6			
Q Average	5.6	17.7		1.9	4.9	10.2	5.1			
Q Spacing	25.0	25.0		25.0	25.0	25.0	25.0			
Q Storage	0	0		0	0	0	0			
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2		1.2	1.2	1.2	1.2			
BOQ	6.6	20.6		2.2	5.8	12.0	6.1			
QSRatio										
85th Percentile Output:										
fB%	1.5	1.5		1.6	1.6	1.5	1.6			
BOQ	8.7	25.9		2.9	7.6	15.4	8.0			
QSRatio										
90th Percentile Output:										
fB%	1.7	1.6		1.8	1.7	1.6	1.7			
BOQ	9.5	27.6		3.3	8.4	16.7	8.8			
QSRatio										
95th Percentile Output:										
fB%	1.9	1.7		2.0	2.0	1.8	2.0			
BOQ	10.8	30.5		3.8	9.6	18.8	10.0			
QSRatio										
98th Percentile Output:										
fB%	2.4	2.0		2.6	2.4	2.2	2.4			
BOQ	13.1	34.6		4.8	11.7	22.0	12.2			
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 NB Ramps

Inter.: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
LGConfig	L	T			T	R		LT	R			
Volume	169	558			962	627	158	884	189			
Lane Width	12.0	12.0			12.0	12.0		12.0	12.0			
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	12.9	5.0	42.5	0.0		40.4	0.0	
Yellow	3.6	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	190	1770	0.94	0.11	100.6	F		
T	2069	3547	0.28	0.58	12.6	B	33.0	C
Westbound								
T	1552	3547	0.65	0.44	27.6	C	38.7	D
R	693	1583	0.95	0.44	55.7	E		
Northbound								
LT	1185	3520	0.93	0.34	50.6	D	47.5	D
R	533	1583	0.37	0.34	30.6	C		
Southbound								

Intersection Delay = 40.6 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Paularino at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 NB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	169	558			962	627	158	884	189			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	44	147			253	165	42	233	50			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900		1900	1900			
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
LGConfig	L	T			T	R		LT	R			
Lane Width	12.0	12.0			12.0	12.0		12.0	12.0			
RTOR Vol					0			0				
Adj Flow	178	587			1013	660		1097	199			
%InSharedLn												
Prop LTs		0.000			0.000			0.151				
Prop RTs		0.000			0.000	1.000		0.000	1.000			
Peds Bikes					0			0			0	
Buses	0	0			0	0		0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0		0.0	0.0			
Arriv. Type	3	3			3	3		3	3			
Unit Ext.	3.0	3.0			3.0	3.0		3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0		2.0	2.0			
Ext of g	2.0	2.0			2.0	2.0		2.0	2.0			
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	12.9	5.0	42.5	0.0		40.4	0.0	
Yellow	3.6	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	169	558			962	627	158	884	189			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	178	587			1013	660	166	931	199			
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
Lane group	L	T			T	R		LT	R			
Adj flow	178	587			1013	660		1097	199			
Prop LTs		0.000			0.000			0.151				
Prop RTs		0.000			0.000	1.000		0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound			Northbound			Southbound		
LG	L	T			T	R		LT	R				
So	1900	1900			1900	1900		1900	1900				
Lanes	1	2	0	0	2	1	0	2	1	0	0	0	
fW	1.000	1.000			1.000	1.000		1.000	1.000				
fHV	0.980	0.980			0.980	0.980		0.980	0.980				
fG	1.000	1.000			1.000	1.000		1.000	1.000				
fP	1.000	1.000			1.000	1.000		1.000	1.000				
fBB	1.000	1.000			1.000	1.000		1.000	1.000				
fA	1.000	1.000			1.000	1.000		1.000	1.000				
fLU	1.000	0.952			0.952	1.000		0.952	1.000				
fRT		1.000			1.000	0.850		1.000	0.850				
fLT	0.950	1.000			1.000			0.992					
Sec.													
fLpb	1.000	1.000			1.000			1.000					
fRpb		1.000			1.000	1.000		1.000	1.000				
S	1770	3547			3547	1583		3520	1583				
Sec.													

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	178	1770	#	0.10	0.11	190	0.94
Prot								
Perm								
Thru	T	587	3547		0.17	0.58	2069	0.28
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1013	3547		0.29	0.44	1552	0.65
Right	R	660	1583	#	0.42	0.44	693	0.95
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	1097	3520	#	0.31	0.34	1185	0.93
Right	R	199	1583		0.13	0.34	533	0.37
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.83
Total lost time per cycle, L = 14.20 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.94

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.94	0.11	53.1	1.000	190	0.45	47.5	0.0	100.6	F		
T	0.28	0.58	12.5	1.000	2069	0.11	0.1	0.0	12.6	B	33.0	C
Westbound												
T	0.65	0.44	26.6	1.000	1552	0.23	1.0	0.0	27.6	C	38.7	D
R	0.95	0.44	32.5	1.000	693	0.46	23.1	0.0	55.7	E		
Northbound												
LT	0.93	0.34	38.4	1.000	1185	0.44	12.3	0.0	50.6	D	47.5	D
R	0.37	0.34	30.2	1.000	533	0.11	0.4	0.0	30.6	C		
Southbound												

Intersection delay = 40.6 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.151	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	120.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	53.5	53.1	0.00	0.0	0.0	100.6

T	0.0	0.00	25.0	12.5	0.00	0.0	0.0	12.6
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	33.8	26.6	0.00	0.0	0.0	27.6
R	0.0	0.00	33.8	32.5	0.00	0.0	0.0	55.7
Northbound								
	0.0						0.0	
LT	0.0	0.00	39.8	38.4	0.00	0.0	0.0	50.6
R	0.0	0.00	39.8	30.2	0.00	0.0	0.0	30.6
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 40.6 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup	L	T		T	R	LT	R			
Init Queue	0.0	0.0		0.0	0.0	0.0	0.0			
Flow Rate	178	308		532	660	576	199			
So	1900	1900		1900	1900	1900	1900			
No.Lanes	1	2	0	0 2	1	0 2	1	0 0	0	
SL	1770	1862		1862	1583	1848	1583			
LnCapacity	190	1086		815	693	622	533			
Flow Ratio	0.1	0.2		0.3	0.4	0.3	0.1			
v/c Ratio	0.94	0.28		0.65	0.95	0.93	0.37			
Grn Ratio	0.11	0.58		0.44	0.44	0.34	0.34			
I Factor		1.000		1.000		1.000				
AT or PVG	3	3		3	3	3	3			
Pltn Ratio	1.00	1.00		1.00	1.00	1.00	1.00			
PF2	1.00	1.00		1.00	1.00	1.00	1.00			
Q1	5.9	5.1		14.0	21.2	18.5	5.0			
kB	0.3	0.9		0.7	0.7	0.6	0.6			
Q2	2.0	0.3		1.3	5.6	4.4	0.3			
Q Average	7.8	5.5		15.3	26.8	22.9	5.4			
Q Spacing	25.0	25.0		25.0	25.0	25.0	25.0			
Q Storage	0	0		0	0	0	0			
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2		1.2	1.2	1.2	1.2			
BOQ	9.3	6.5		17.8	30.9	26.5	6.4			
QSRatio										
85th Percentile Output:										
fB%	1.5	1.6		1.5	1.4	1.4	1.6			
BOQ	12.0	8.5		22.6	38.1	33.0	8.3			
QSRatio										
90th Percentile Output:										
fB%	1.7	1.7		1.6	1.5	1.5	1.7			
BOQ	13.1	9.3		24.2	40.3	35.0	9.2			
QSRatio										
95th Percentile Output:										
fB%	1.9	1.9		1.8	1.6	1.7	1.9			
BOQ	14.8	10.6		26.8	43.8	38.2	10.4			
QSRatio										
98th Percentile Output:										
fB%	2.2	2.4		2.0	1.8	1.9	2.4			
BOQ	17.6	12.9		30.7	49.0	42.8	12.7			
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 SB Ramps

Inter.: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
LGConfig		TR		L	T						LT	R
Volume		1114	167	117	223					796	956	187
Lane Width		12.0		12.0	12.0						12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	5.6	15.3	24.3	0.0	61.0	0.0		
Yellow	3.2	4.0	4.0		3.6			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 125.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
TR	1241	3477	1.09	0.36	92.8	F	92.8	F
Westbound								
L	79	1770	1.56	0.04	363.0	F		
T	1544	3547	0.15	0.44	21.4	C	138.8	F
Northbound								
Southbound								
LT	1692	3468	1.09	0.49	82.7	F	76.6	E
R	773	1583	0.25	0.49	18.9	B		

Intersection Delay = 88.4 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Paularino at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 SB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1114	167	117	223					796	956	187
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		293	44	31	59					209	252	49
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900		1900	1900						1900	1900
ParkExist												
NumPark												
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
LGConfig		TR		L	T						LT	R
Lane Width		12.0		12.0	12.0						12.0	12.0
RTOR Vol			0									0
Adj Flow		1349		123	235						1844	197
%InSharedLn												
Prop LTs		0.000			0.000						0.454	
Prop RTs		0.130			0.000						0.000	1.000
Peds Bikes		0						0			0	
Buses		0		0	0						0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0						0.0	0.0
Arriv. Type		3		3	3						3	3
Unit Ext.		3.0		3.0	3.0						3.0	3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0		2.0	2.0						2.0	2.0
Ext of g		2.0		2.0	2.0						2.0	2.0
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	5.6	15.3	24.3	0.0		61.0	0.0	
Yellow	3.2	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 125.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1114	167	117	223					796	956	187
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		1173	176	123	235					838	1006	197
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
Lane group		TR		L	T						LT	R
Adj flow		1349		123	235						1844	197
Prop LTs		0.000			0.000						0.454	
Prop RTs		0.130			0.000						0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound			Northbound			Southbound	
LG	TR		L	T					LT	R
So	1900		1900	1900					1900	1900
Lanes	0 2	0	1	2	0	0 0	0	0	2	1
fW	1.000		1.000	1.000					1.000	1.000
fHV	0.980		0.980	0.980					0.980	0.980
fG	1.000		1.000	1.000					1.000	1.000
fP	1.000		1.000	1.000					1.000	1.000
fBB	1.000		1.000	1.000					1.000	1.000
fA	1.000		1.000	1.000					1.000	1.000
fLU	0.952		1.000	0.952					0.952	1.000
fRT	0.980			1.000					1.000	0.850
fLT	1.000		0.950	1.000					0.978	
Sec.										
fLpb	1.000		1.000	1.000					1.000	
fRpb	1.000			1.000					1.000	1.000
S	3477		1770	3547					3468	1583
Sec.										

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	TR	1349	3477	# 0.39	0.36	1241	1.09
Right							
Westbound							
Prot							
Perm							
Left	L	123	1770	# 0.07	0.04	79	1.56
Prot							
Perm							
Thru	T	235	3547	0.07	0.44	1544	0.15
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LT	1844	3468	# 0.53	0.49	1692	1.09
Right	R	197	1583	0.12	0.49	773	0.25

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.99
Total lost time per cycle, L = 13.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.11

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	1.09	0.36	40.2	1.000	1241	0.50	52.6	0.0	92.8	F	92.8	F
Westbound												
L	1.56	0.04	59.7	1.000	79	0.50	303.3	0.0	363.0	F		
T	0.15	0.44	21.4	1.000	1544	0.11	0.0	0.0	21.4	C	138.8	F
Northbound												
Southbound												

LT	1.09	0.49	32.0	1.000	1692	0.50	50.7	0.0	82.7	F	76.6 E
R	0.25	0.49	18.7	1.000	773	0.11	0.2	0.0	18.9	B	

Intersection delay = 88.4 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.454
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	125.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	40.2	40.2	0.00	27.0	0.0	92.8
	0.0						0.0	
Westbound								
L	0.0	0.00	59.7	59.7	0.00	11.0	0.0	363.0
T	0.0	0.00	35.3	21.4	0.00	0.0	0.0	21.4
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LT	0.0	0.00	32.0	32.0	0.00	38.0	0.0	82.7
R	0.0	0.00	32.0	18.7	0.00	0.0	0.0	18.9

Intersection Delay 88.4 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound	
LaneGroup	TR			L	T					LT	R
Init Queue	0.0			0.0	0.0					0.0	0.0
Flow Rate	708			123	123					968	197
So	1900			1900	1900					1900	1900
No.Lanes	0	2	0	1	2	0	0	0	0	2	1
SL	1826			1770	1862					1821	1583
LnCapacity	651			79	810					888	773
Flow Ratio	0.4			0.1	0.1					0.5	0.1
v/c Ratio	1.09			1.56	0.15					1.09	0.25
Grn Ratio	0.36			0.04	0.44					0.49	0.49
I Factor	1.000				1.000					1.000	
AT or PVG	3			3	3					3	3
Pltn Ratio	1.00			1.00	1.00					1.00	1.00
PF2	1.00			1.00	1.00					1.00	1.00
Q1	24.6			4.3	2.6					33.6	4.0
kB	0.6			0.2	0.7					0.8	0.7
Q2	11.9			6.0	0.1					15.9	0.2
Q Average	36.5			10.2	2.7					49.6	4.2
Q Spacing	25.0			25.0	25.0					25.0	25.0
Q Storage	0			0	0					0	0
Q S Ratio											
70th Percentile Output:											
fB%	1.1			1.2	1.2					1.1	1.2
BOQ	41.6			12.1	3.2					55.9	5.1
QSRatio											
85th Percentile Output:											
fB%	1.4			1.5	1.6					1.4	1.6
BOQ	50.7			15.5	4.3					67.3	6.6
QSRatio											
90th Percentile Output:											
fB%	1.5			1.6	1.7					1.4	1.7
BOQ	53.5			16.8	4.7					71.0	7.3
QSRatio											
95th Percentile Output:											
fB%	1.6			1.8	2.0					1.5	2.0
BOQ	57.7			18.8	5.5					76.2	8.4
QSRatio											
98th Percentile Output:											
fB%	1.8			2.2	2.5					1.7	2.4
BOQ	64.3			22.1	6.8					85.3	10.3
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 SB Ramps

Inter.: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
LGConfig		TR		L	T						LT	R
Volume		518	106	285	842					172	709	308
Lane Width		12.0		12.0	12.0						12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	14.8	5.8	5.0	0.0	20.6	0.0		
Yellow	3.2	4.0	4.0		3.6			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	840	3456	0.78	0.24	27.8	C	27.8	C
Westbound								
L	403	1770	0.74	0.23	30.7	C		
T	1899	3547	0.47	0.54	9.5	A	14.9	B
Northbound								
Southbound								
LT	1113	3512	0.83	0.32	26.2	C	25.1	C
R	502	1583	0.65	0.32	21.9	C		

Intersection Delay = 21.7 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Paularino at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 SB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		518	106	285	842					172	709	308
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		136	28	75	222					45	187	81
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900		1900	1900						1900	1900
ParkExist												
NumPark												
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
LGConfig		TR		L	T						LT	R
Lane Width		12.0		12.0	12.0						12.0	12.0
RTOR Vol			0									0
Adj Flow		657		300	886						927	324
%InSharedLn												
Prop LTs		0.000			0.000						0.195	
Prop RTs		0.170			0.000						0.000	1.000
Peds Bikes		0						0			0	
Buses		0		0	0						0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0						0.0	0.0
Arriv. Type		3		3	3						3	3
Unit Ext.		3.0		3.0	3.0						3.0	3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0		2.0	2.0						2.0	2.0
Ext of g		2.0		2.0	2.0						2.0	2.0
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	14.8	5.8	5.0	0.0		20.6	0.0	
Yellow	3.2	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		518	106	285	842					172	709	308
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		545	112	300	886					181	746	324
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
Lane group		TR		L	T						LT	R
Adj flow		657		300	886						927	324
Prop LTs		0.000			0.000						0.195	
Prop RTs		0.170			0.000						0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound				Southbound	
LG	TR		L	T					LT	R
So	1900		1900	1900					1900	1900
Lanes	0 2	0	1	2	0 0	0	0	0	2	1
fW	1.000		1.000	1.000					1.000	1.000
fHV	0.980		0.980	0.980					0.980	0.980
fG	1.000		1.000	1.000					1.000	1.000
fP	1.000		1.000	1.000					1.000	1.000
fBB	1.000		1.000	1.000					1.000	1.000
fA	1.000		1.000	1.000					1.000	1.000
fLU	0.952		1.000	0.952					0.952	1.000
fRT	0.974			1.000					1.000	0.850
fLT	1.000		0.950	1.000					0.990	
Sec.										
fLpb	1.000		1.000	1.000					1.000	
fRpb	1.000			1.000					1.000	1.000
S	3456		1770	3547					3512	1583
Sec.										

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	TR	657	3456	# 0.19	0.24	840	0.78
Right							
Westbound							
Prot							
Perm							
Left	L	300	1770	# 0.17	0.23	403	0.74
Prot							
Perm							
Thru	T	886	3547	0.25	0.54	1899	0.47
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LT	927	3512	# 0.26	0.32	1113	0.83
Right	R	324	1583	0.20	0.32	502	0.65

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.62
Total lost time per cycle, L = 13.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.79

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	0.78	0.24	23.0	1.000	840	0.33	4.8	0.0	27.8	C	27.8	C
Westbound												
L	0.74	0.23	23.3	1.000	403	0.30	7.4	0.0	30.7	C		
T	0.47	0.54	9.4	1.000	1899	0.11	0.2	0.0	9.5	A	14.9	B
Northbound												
Southbound												

LT	0.83	0.32	20.6	1.000	1113	0.37	5.5	0.0	26.2	C	25.1 C
R	0.65	0.32	19.1	1.000	502	0.22	2.9	0.0	21.9	C	

Intersection delay = 21.7 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.195
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	24.6	23.0	0.00	0.0	0.0	27.8
	0.0						0.0	
Westbound								
L	0.0	0.00	25.1	23.3	0.00	0.0	0.0	30.7
T	0.0	0.00	15.1	9.4	0.00	0.0	0.0	9.5
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LT	0.0	0.00	22.2	20.6	0.00	0.0	0.0	26.2
R	0.0	0.00	22.2	19.1	0.00	0.0	0.0	21.9

Intersection Delay 21.7 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup	TR	L T		LT R
Init Queue	0.0	0.0 0.0		0.0 0.0
Flow Rate	345	300 465		486 324
So	1900	1900 1900		1900 1900
No.Lanes	0 2 0	1 2 0	0 0 0	0 2 1
SL	1815	1770 1862		1844 1583
LnCapacity	441	403 997		584 502
Flow Ratio	0.2	0.2 0.2		0.3 0.2
v/c Ratio	0.78	0.74 0.47		0.83 0.65
Grn Ratio	0.24	0.23 0.54		0.32 0.32
I Factor	1.000	1.000		1.000
AT or PVG	3	3 3		3 3
Pltn Ratio	1.00	1.00 1.00		1.00 1.00
PF2	1.00	1.00 1.00		1.00 1.00
Q1	5.8	5.0 5.2		8.1 5.0
kB	0.3	0.3 0.6		0.4 0.4
Q2	1.1	0.9 0.5		1.8 0.7
Q Average	7.0	5.9 5.7		9.9 5.7
Q Spacing	25.0	25.0 25.0		25.0 25.0
Q Storage	0	0 0		0 0
Q S Ratio				
70th Percentile Output:				
fB%	1.2	1.2 1.2		1.2 1.2
BOQ	8.2	7.0 6.8		11.7 6.7
QSRatio				
85th Percentile Output:				
fB%	1.5	1.5 1.5		1.5 1.5
BOQ	10.7	9.2 8.8		15.0 8.8
QSRatio				
90th Percentile Output:				
fB%	1.7	1.7 1.7		1.6 1.7
BOQ	11.7	10.1 9.7		16.3 9.7
QSRatio				
95th Percentile Output:				
fB%	1.9	1.9 1.9		1.8 1.9
BOQ	13.3	11.5 11.0		18.3 11.0
QSRatio				
98th Percentile Output:				
fB%	2.3	2.3 2.3		2.2 2.3
BOQ	15.9	13.8 13.3		21.5 13.3
QSRatio				

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 NB Ramps

Inter.: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Volume		1567	630		597	250	1103		633			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru		A			Thru				
Right		A	A		Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right		A	A		EB Right	A			
SB Right					WB Right	A			
Green		54.7	4.5	0.0		55.1	0.0		
Yellow		4.5	4.5			3.6			
All Red		1.0	1.0			1.0			

Cycle Length: 129.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1494	3547	1.10	0.42	94.8	F	67.6	E
R	1583	1583	0.42	1.00	0.2	A		
Westbound								
T	2527	5074	0.25	0.50	18.7	B	13.2	B
R	1583	1583	0.17	1.00	0.0+	A		
Northbound								
L	1458	3437	0.80	0.42	35.7	D		
							22.8	C
R	1583	1583	0.42	1.00	0.2	A		
Southbound								

Intersection Delay = 41.7 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Macarthur at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1567	630		597	250	1103		633			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		412	166		157	66	290		167			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900		1900			
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			
Adj Flow		1649	663		628	263	1161		666			
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			
Peds Bikes	0			0			0			0		
Buses		0	0		0	0	0		0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0		0.0			
Arriv. Type		3	3		3	3	3		3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0		3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0		2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0		2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A				Thru			
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right	A		
SB Right					WB Right	A		
Green	54.7	4.5	0.0		55.1	0.0		
Yellow	4.5	4.5			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 129.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1567	630		597	250	1103		633			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		1649	663		628	263	1161		666			
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
Lane group		T	R		T	R	L		R			
Adj flow		1649	663		628	263	1161		666			
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R		L	R				
So	1900	1900		1900	1900		1900	1900				
Lanes	0 2	1	0	3	1	0	2	1	0	0	0	
fW	1.000	1.000		1.000	1.000		1.000	1.000				
fHV	0.980	0.980		0.980	0.980		0.980	0.980				
fG	1.000	1.000		1.000	1.000		1.000	1.000				
fP	1.000	1.000		1.000	1.000		1.000	1.000				
fBB	1.000	1.000		1.000	1.000		1.000	1.000				
fA	1.000	1.000		1.000	1.000		1.000	1.000				
fLU	0.952	1.000		0.908	1.000		0.971	1.000				
fRT	1.000	0.850		1.000	0.850			0.850				
fLT	1.000			1.000			0.950					
Sec.												
fLpb	1.000			1.000			1.000					
fRpb	1.000	1.000		1.000	1.000			1.000				
S	3547	1583		5074	1583		3437	1583				
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1649	3547		0.46	0.42	1494	1.10
Right	R	663	1583		0.42	1.00	1583	0.42
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	628	5074	#	0.12	0.50	2527	0.25
Right	R	263	1583		0.17	1.00	1583	0.17
Northbound								
Prot								
Perm								
Left	L	1161	3437	#	0.34	0.42	1458	0.80
Prot								
Perm								
Thru								
Right	R	666	1583		0.42	1.00	1583	0.42
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.46
Total lost time per cycle, L = 10.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.50

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	1.10	0.42	37.6	1.000	1494	0.50	57.2	0.0	94.8	F	67.6	E
R	0.42	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Westbound												
T	0.25	0.50	18.7	1.000	2527	0.11	0.1	0.0	18.7	B	13.2	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Northbound												
L	0.80	0.42	32.5	1.000	1458	0.34	3.2	0.0	35.7	D		
											22.8	C
R	0.42	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

Intersection delay = 41.7 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 129.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 129.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	129.9 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	37.6	37.6	0.00	38.8	0.0	94.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
	0.0						0.0	
T	0.0	0.00	32.6	18.7	0.00	0.0	0.0	18.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Northbound								
L	0.0	0.00	37.4	32.5	0.00	0.0	0.0	35.7
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 41.7 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	T	R	T	R	L	R		
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0		
Flow Rate	866	663	230	263	597	666		
So	1900	1900	1900	1900	1900	1900		
No.Lanes	0 2	1	0 3	1	2 0	1	0 0	0
SL	1862	1583	1862	1583	1770	1583		
LnCapacity	784	1583	927	1583	750	1583		
Flow Ratio	0.5	0.4	0.1	0.2	0.3	0.4		
v/c Ratio	1.10	0.42	0.25	0.17	0.80	0.42		
Grn Ratio	0.42	1.00	0.50	1.00	0.42	1.00		
I Factor	1.000		1.000		1.000			
AT or PVG	3	3	3	3	3	3		
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
PF2	1.00		1.00		1.00			
Q1	31.2		4.8		18.7			
kB	0.7	1.1	0.8	1.1	0.7	1.1		
Q2	15.5	0.8	0.3	0.2	2.5	0.8		
Q Average	46.7		5.0		21.2			
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0		
Q Storage	0	0	0	0	0	0		
Q S Ratio								
70th Percentile Output:								
fB%	1.1		1.2		1.2			
BOQ	52.8		6.0		24.6			
QSRatio								
85th Percentile Output:								
fB%	1.4		1.6		1.4			
BOQ	63.7		7.8		30.7			
QSRatio								
90th Percentile Output:								
fB%	1.4		1.7		1.5			
BOQ	67.2		8.6		32.7			
QSRatio								
95th Percentile Output:								
fB%	1.5		2.0		1.7			
BOQ	72.1		9.8		35.8			
QSRatio								
98th Percentile Output:								
fB%	1.7		2.4		1.9			
BOQ	80.7		12.0		40.2			
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 NB Ramps

Inter.: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Volume		787	790		1740	1210	730		223			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left A			
Thru	A	A			Thru			
Right	A	A			Right A			
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right A			
SB Right					WB Right A			
Green	23.0	8.0	0.0		16.4	0.0		
Yellow	1.5	4.5			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1980	3547	0.42	0.56	7.8	A	4.0	A
R	1583	1583	0.53	1.00	0.3	A		
Westbound								
T	2833	5074	0.65	0.56	9.7	A	7.0	A
R	1583	1583	0.80	1.00	3.1	A		
Northbound								
L	939	3437	0.82	0.27	26.2	C		
							20.0+	C
R	1583	1583	0.15	1.00	0.0+	A		
Southbound								

Intersection Delay = 8.4 (sec/veh) Intersection LOS = A

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Macarthur at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		787	790		1740	1210	730		223			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		207	208		458	318	192		59			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900		1900			
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			
Adj Flow		828	832		1832	1274	768		235			
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0	0	0		0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0		0.0			
Arriv. Type		3	3		3	3	3		3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0		3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0		2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0		2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right	A		
SB Right					WB Right	A		
Green	23.0	8.0	0.0		16.4	0.0		
Yellow	1.5	4.5			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		787	790		1740	1210	730		223			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		828	832		1832	1274	768		235			
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
Lane group		T	R		T	R	L		R			
Adj flow		828	832		1832	1274	768		235			
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R	L	R					
So	1900	1900		1900	1900	1900	1900					
Lanes	0 2	1	0	3	1	2	0 1	0	0	0		
fW	1.000	1.000		1.000	1.000	1.000	1.000					
fHV	0.980	0.980		0.980	0.980	0.980	0.980					
fG	1.000	1.000		1.000	1.000	1.000	1.000					
fP	1.000	1.000		1.000	1.000	1.000	1.000					
fBB	1.000	1.000		1.000	1.000	1.000	1.000					
fA	1.000	1.000		1.000	1.000	1.000	1.000					
fLU	0.952	1.000		0.908	1.000	0.971	1.000					
fRT	1.000	0.850		1.000	0.850		0.850					
fLT	1.000			1.000		0.950						
Sec.												
fLpb	1.000			1.000		1.000						
fRpb	1.000	1.000		1.000	1.000		1.000					
S	3547	1583		5074	1583	3437	1583					
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	828	3547	0.23	0.56	1980	0.42
Right	R	832	1583	0.53	1.00	1583	0.53
Westbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1832	5074	0.36	0.56	2833	0.65
Right	R	1274	1583	# 0.80	1.00	1583	0.80
Northbound							
Prot							
Perm							
Left	L	768	3437	0.22	0.27	939	0.82
Prot							
Perm							
Thru							
Right	R	235	1583	0.15	1.00	1583	0.15
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.80
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.80

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.42	0.56	7.6	1.000	1980	0.11	0.1	0.0	7.8	A	4.0	A
R	0.53	1.00	0.0	0.950	1583	0.13	0.3	0.0	0.3	A		
Westbound												
T	0.65	0.56	9.2	1.000	2833	0.22	0.5	0.0	9.7	A	7.0	A
R	0.80	1.00	0.0	0.950	1583	0.35	3.1	0.0	3.1	A		
Northbound												
L	0.82	0.27	20.4	1.000	939	0.36	5.8	0.0	26.2	C		
											20.0+	C
R	0.15	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Southbound												

Intersection delay = 8.4 (sec/veh) Intersection LOS = A

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	13.3	7.6	0.00	0.0	0.0	7.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.3
Westbound								
	0.0						0.0	
T	0.0	0.00	13.3	9.2	0.00	0.0	0.0	9.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	3.1
Northbound								
L	0.0	0.00	21.8	20.4	0.00	0.0	0.0	26.2
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 8.4 sec/veh Intersection LOS A

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	T	R	T	R	L	R		
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0		
Flow Rate	434	832	672	1274	395	235		
So	1900	1900	1900	1900	1900	1900		
No.Lanes	0 2	1	0 3	1	2 0	1	0 0	0
SL	1862	1583	1862	1583	1770	1583		
LnCapacity	1039	1583	1040	1583	483	1583		
Flow Ratio	0.2	0.5	0.4	0.8	0.2	0.1		
v/c Ratio	0.42	0.53	0.65	0.80	0.82	0.15		
Grn Ratio	0.56	1.00	0.56	1.00	0.27	1.00		
I Factor	1.000		1.000		1.000			
AT or PVG	3	3	3	3	3	3		
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
PF2	1.00		1.00		1.00			
Q1	4.2		7.7		6.2			
kB	0.6	0.7	0.6	0.7	0.3	0.7		
Q2	0.4	0.8	1.0	2.7	1.4	0.1		
Q Average	4.6		8.7		7.6			
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0		
Q Storage	0	0	0	0	0	0		
Q S Ratio								
70th Percentile Output:								
fB%	1.2		1.2		1.2			
BOQ	5.4		10.3		8.9			
QSRatio								
85th Percentile Output:								
fB%	1.6		1.5		1.5			
BOQ	7.1		13.3		11.6			
QSRatio								
90th Percentile Output:								
fB%	1.7		1.7		1.7			
BOQ	7.8		14.5		12.6			
QSRatio								
95th Percentile Output:								
fB%	2.0		1.9		1.9			
BOQ	9.0		16.3		14.3			
QSRatio								
98th Percentile Output:								
fB%	2.4		2.2		2.3			
BOQ	11.0		19.3		17.1			
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 SB Ramps

Inter.: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Volume		1314	760		1289	170				1076		1021
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	14.3	7.7	0.0		27.4	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 64.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1503	3547	0.92	0.42	27.2	C	17.3	B
R	1583	1583	0.51	1.00	0.3	A		
Westbound								
T	2150	5074	0.63	0.42	15.3	B	13.5	B
R	1583	1583	0.11	1.00	0.0+	A		
Northbound								
Southbound								
L	1451	3437	0.78	0.42	19.0	B		
							23.4	C
R	1183	2803	0.91	0.42	27.9	C		

Intersection Delay = 18.6 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 SB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1314	760		1289	170				1076		1021
% Heavy Veh		2	2		2	2				2		2
PHF		0.95	0.95		0.95	0.95				0.95		0.95
PK 15 Vol		346	200		339	45				283		269
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900		1900	1900				1900		1900
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
LGConfig		T	R		T	R				L		R
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0
Adj Flow		1383	800		1357	179				1133		1075
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000
Peds Bikes	0			0			0			0		
Buses		0	0		0	0				0		0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0				0.0		0.0
Arriv. Type		3	3		3	3				3		3
Unit Ext.		3.0	3.0		3.0	3.0				3.0		3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0		2.0	2.0				2.0		2.0
Ext of g		2.0	2.0		2.0	2.0				2.0		2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	14.3	7.7	0.0		27.4	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 64.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1314	760		1289	170				1076		1021
PHF		0.95	0.95		0.95	0.95				0.95		0.95
Adj flow		1383	800		1357	179				1133		1075
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
Lane group		T	R		T	R				L		R
Adj flow		1383	800		1357	179				1133		1075
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R					L		R
So	1900	1900		1900	1900					1900		1900
Lanes	0 2	1	0	3	1	0	0	0		2	0	2
fW	1.000	1.000		1.000	1.000					1.000		1.000
fHV	0.980	0.980		0.980	0.980					0.980		0.980
fG	1.000	1.000		1.000	1.000					1.000		1.000
fP	1.000	1.000		1.000	1.000					1.000		1.000
fBB	1.000	1.000		1.000	1.000					1.000		1.000
fA	1.000	1.000		1.000	1.000					1.000		1.000
fLU	0.952	1.000		0.908	1.000					0.971		0.885
fRT	1.000	0.850		1.000	0.850							0.850
fLT	1.000			1.000						0.950		
Sec.												
fLpb	1.000			1.000						1.000		
fRpb	1.000	1.000		1.000	1.000							1.000
S	3547	1583		5074	1583					3437		2803
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1383	3547	#	0.39	0.42	1503	0.92
Right	R	800	1583		0.51	1.00	1583	0.51
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1357	5074		0.27	0.42	2150	0.63
Right	R	179	1583		0.11	1.00	1583	0.11
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	1133	3437		0.33	0.42	1451	0.78
Prot								
Perm								
Thru								
Right	R	1075	2803	#	0.38	0.42	1183	0.91

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.77
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.91

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.92	0.42	17.7	1.000	1503	0.44	9.5	0.0	27.2	C	17.3	B
R	0.51	1.00	0.0	0.950	1583	0.11	0.3	0.0	0.3	A		
Westbound												
T	0.63	0.42	14.7	1.000	2150	0.21	0.6	0.0	15.3	B	13.5	B
R	0.11	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Northbound												
Southbound												
L	0.78	0.42	16.2	1.000	1451	0.33	2.8	0.0	19.0	B		

```
                                                                        23.4   C
R    0.91  0.42  17.6  1.000 1183  0.43   10.4  0.0   27.9   C
_____________________________________________________________________________
          Intersection delay = 18.6  (sec/veh)   Intersection LOS = B


_____________________SUPPLEMENTAL PERMITTED LT WORKSHEET_____________________
                            for exclusive lefts
Input
                                                        EB    WB    NB    SB
Opposed by Single(S) or Multiple(M) lane approach
Cycle length, C                          64.9    sec
Total actual green time for LT lane group, G (s)
Effective permitted green time for LT lane group, g(s)
Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo                        0.908 0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g  or  fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____________________SUPPLEMENTAL PERMITTED LT WORKSHEET_____________________
                              for shared lefts
Input
                                                        EB    WB    NB    SB
Opposed by Single(S) or Multiple(M) lane approach
Cycle length, C                          64.9    sec
Total actual green time for LT lane group, G (s)
Effective permitted green time for LT lane group, g(s)
Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT                  0.000 0.000
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo                        0.908 0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
```

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	64.9 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	18.7	17.7	0.00	0.0	0.0	27.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.3
Westbound								
	0.0						0.0	
T	0.0	0.00	18.7	14.7	0.00	0.0	0.0	15.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
L	0.0	0.00	18.8	16.2	0.00	0.0	0.0	19.0
	0.0						0.0	
R	0.0	0.00	18.8	17.6	0.00	0.0	0.0	27.9

Intersection Delay 18.6 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound			Southbound		
LaneGroup	T	R	T	R				L		R
Init Queue	0.0	0.0	0.0	0.0				0.0		0.0
Flow Rate	726	800	498	179				583		607
So	1900	1900	1900	1900				1900		1900
No.Lanes	0 2	1	0 3	1	0	0	0	2	0	2
SL	1862	1583	1862	1583				1770		1584
LnCapacity	789	1583	789	1583				747		668
Flow Ratio	0.4	0.5	0.3	0.1				0.3		0.4
v/c Ratio	0.92	0.51	0.63	0.11				0.78		0.91
Grn Ratio	0.42	1.00	0.42	1.00				0.42		0.42
I Factor	1.000		1.000					1.000		
AT or PVG	3	3	3	3				3		3
Pltn Ratio	1.00	1.00	1.00	1.00				1.00		1.00
PF2	1.00		1.00					1.00		1.00
Q1	12.4		7.1					9.1		10.3
kB	0.5	0.7	0.5	0.7				0.5		0.4
Q2	3.8	0.8	0.8	0.1				1.6		3.1
Q Average	16.2		7.9					10.6		13.4
Q Spacing	25.0	25.0	25.0	25.0				25.0		25.0
Q Storage	0	0	0	0				0		0
Q S Ratio										
70th Percentile Output:										
fB%	1.2		1.2					1.2		1.2
BOQ	18.9		9.3					12.5		15.7
QSRatio										
85th Percentile Output:										
fB%	1.5		1.5					1.5		1.5
BOQ	23.9		12.1					16.1		20.0
QSRatio										
90th Percentile Output:										
fB%	1.6		1.7					1.6		1.6
BOQ	25.5		13.2					17.4		21.5
QSRatio										
95th Percentile Output:										
fB%	1.7		1.9					1.8		1.8
BOQ	28.2		14.9					19.5		23.9
QSRatio										
98th Percentile Output:										
fB%	2.0		2.2					2.1		2.1
BOQ	32.2		17.7					22.8		27.6
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 SB Ramps

Inter.: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Volume		1177	1044		1739	803				308		750
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	15.7	8.3	0.0		20.5	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1744	3547	0.71	0.49	13.3	B	7.7	A
R	1583	1583	0.69	1.00	1.3	A		
Westbound								
T	2495	5074	0.73	0.49	13.3	B	9.2	A
R	1583	1583	0.53	1.00	0.4	A		
Northbound								
Southbound								
L	1174	3437	0.28	0.34	14.5	B		
							21.2	C
R	958	2803	0.82	0.34	24.0	C		

Intersection Delay = 10.8 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 SB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1177	1044		1739	803				308		750
% Heavy Veh		2	2		2	2				2		2
PHF		0.95	0.95		0.95	0.95				0.95		0.95
PK 15 Vol		310	275		458	211				81		197
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900		1900	1900				1900		1900
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
LGConfig		T	R		T	R				L		R
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0
Adj Flow		1239	1099		1831	845				324		789
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000
Peds Bikes	0			0			0			0		
Buses		0	0		0	0				0		0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0				0.0		0.0
Arriv. Type		3	3		3	3				3		3
Unit Ext.		3.0	3.0		3.0	3.0				3.0		3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0		2.0	2.0				2.0		2.0
Ext of g		2.0	2.0		2.0	2.0				2.0		2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	15.7	8.3	0.0		20.5	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1177	1044		1739	803				308		750
PHF		0.95	0.95		0.95	0.95				0.95		0.95
Adj flow		1239	1099		1831	845				324		789
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
Lane group		T	R		T	R				L		R
Adj flow		1239	1099		1831	845				324		789
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R					L		R
So	1900	1900		1900	1900					1900		1900
Lanes	0 2	1	0	3	1	0	0	0		2	0	2
fW	1.000	1.000		1.000	1.000					1.000		1.000
fHV	0.980	0.980		0.980	0.980					0.980		0.980
fG	1.000	1.000		1.000	1.000					1.000		1.000
fP	1.000	1.000		1.000	1.000					1.000		1.000
fBB	1.000	1.000		1.000	1.000					1.000		1.000
fA	1.000	1.000		1.000	1.000					1.000		1.000
fLU	0.952	1.000		0.908	1.000					0.971		0.885
fRT	1.000	0.850		1.000	0.850							0.850
fLT	1.000			1.000						0.950		
Sec.												
fLpb	1.000			1.000						1.000		
fRpb	1.000	1.000		1.000	1.000							1.000
S	3547	1583		5074	1583					3437		2803
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1239	3547		0.35	0.49	1744	0.71
Right	R	1099	1583	#	0.69	1.00	1583	0.69
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1831	5074		0.36	0.49	2495	0.73
Right	R	845	1583		0.53	1.00	1583	0.53
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	324	3437		0.09	0.34	1174	0.28
Prot								
Perm								
Thru								
Right	R	789	2803		0.28	0.34	958	0.82

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.69
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.69

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.71	0.49	11.9	1.000	1744	0.27	1.4	0.0	13.3	B	7.7	A
R	0.69	1.00	0.0	0.950	1583	0.26	1.3	0.0	1.3	A		
Westbound												
T	0.73	0.49	12.1	1.000	2495	0.29	1.2	0.0	13.3	B	9.2	A
R	0.53	1.00	0.0	0.950	1583	0.14	0.4	0.0	0.4	A		
Northbound												
Southbound												
L	0.28	0.34	14.4	1.000	1174	0.11	0.1	0.0	14.5	B		

										21.2	C
R	0.82	0.34	18.1	1.000	958	0.36	5.9	0.0	24.0	C	

Intersection delay = 10.8 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000	0.000		
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	15.3	11.9	0.00	0.0	0.0	13.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.3
Westbound								
	0.0						0.0	
T	0.0	0.00	15.3	12.1	0.00	0.0	0.0	13.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.4
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
L	0.0	0.00	19.8	14.4	0.00	0.0	0.0	14.5
	0.0						0.0	
R	0.0	0.00	19.8	18.1	0.00	0.0	0.0	24.0

Intersection Delay 10.8 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound			Southbound		
LaneGroup	T	R	T	R				L		R
Init Queue	0.0	0.0	0.0	0.0				0.0		0.0
Flow Rate	650	1099	672	845				166		445
So	1900	1900	1900	1900				1900		1900
No.Lanes	2	1	3	1	0	0	0	2	0	2
SL	1862	1583	1862	1583				1770		1584
LnCapacity	915	1583	915	1583				604		541
Flow Ratio	0.3	0.7	0.4	0.5				0.1		0.3
v/c Ratio	0.71	0.69	0.73	0.53				0.27		0.82
Grn Ratio	0.49	1.00	0.49	1.00				0.34		0.34
I Factor	1.000		1.000					1.000		
AT or PVG	3	3	3	3				3		3
Pltn Ratio	1.00	1.00	1.00	1.00				1.00		1.00
PF2	1.00		1.00					1.00		1.00
Q1	8.5		8.9					2.0		6.8
kB	0.5	0.7	0.5	0.7				0.4		0.4
Q2	1.2	1.6	1.4	0.8				0.2		1.5
Q Average	9.7		10.3					2.2		8.3
Q Spacing	25.0	25.0	25.0	25.0				25.0		25.0
Q Storage	0	0	0	0				0		0
Q S Ratio										
70th Percentile Output:										
fB%	1.2		1.2					1.2		1.2
BOQ	11.4		12.1					2.6		9.8
QSRatio										
85th Percentile Output:										
fB%	1.5		1.5					1.6		1.5
BOQ	14.7		15.5					3.4		12.7
QSRatio										
90th Percentile Output:										
fB%	1.6		1.6					1.8		1.7
BOQ	15.9		16.8					3.8		13.9
QSRatio										
95th Percentile Output:										
fB%	1.9		1.8					2.0		1.9
BOQ	17.9		18.9					4.4		15.6
QSRatio										
98th Percentile Output:										
fB%	2.2		2.2					2.5		2.2
BOQ	21.0		22.1					5.5		18.5
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 NB Ramps

Inter.: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Dyer Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L	LTR	R			
Volume		2418	550		1041	330	919	0	762			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru	A			
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right					EB Right	A			
SB Right					WB Right				
Green	40.2	13.6	0.0			51.6	0.0		
Yellow	4.0	4.0				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
T	2486	5074	1.02	0.49	55.0-	D	44.8	D
R	1583	1583	0.37	1.00	0.1	A		
Westbound								
TR	2397	4891	0.60	0.49	22.6	C	22.6	C
Northbound								
L	761	1770	1.27	0.43	166.3	F		
LTR	801	1863	0.00	0.43	19.5	B	149.3	F
R	681	1583	1.18	0.43	128.9	F		
Southbound								

Intersection Delay = 68.9 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Dyer at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 NB Ramps N/S St: Dyer Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		2418	550		1041	330	919	0	762			
% Heavy Veh		2	2		2	2	2	2	2			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
PK 15 Vol		636	145		274	87	242	0	201			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900		1900	1900	1900			
ParkExist												
NumPark												
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L	LTR	R			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol		0			0			0				
Adj Flow		2545	579		1443		967	0	802			
%InSharedLn							0		0			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.240			0.000	1.000			
Peds Bikes	0			0			0			0		
Buses		0	0		0		0	0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0		0.0	0.0	0.0			
Arriv. Type		3	3		3		3	3	3			
Unit Ext.		3.0	3.0		3.0		3.0	3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0		2.0	2.0	2.0			
Ext of g		2.0	2.0		2.0		2.0	2.0	2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left								
Thru	A	A						
Right	A	A						
Peds								
WB Left								
Thru	A	A						
Right	A	A						
Peds								
NB Left					A			
Thru					A			
Right					A			
Peds								
SB Left								
Thru								
Right								
Peds								
NB Right					EB Right	A		
SB Right					WB Right			
Green	40.2	13.6	0.0		51.6	0.0		
Yellow	4.0	4.0			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		2418	550		1041	330	919	0	762			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
Adj flow		2545	579		1096	347	967	0	802			
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
Lane group		T	R		TR		L	LTR	R			
Adj flow		2545	579		1443		967	0	802			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.240			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		TR			L	LTR	R			
So	1900	1900		1900			1900	1900	1900			
Lanes	0 3	1	0	3	0		1	1	1	0	0	0
fW	1.000	1.000		1.000			1.000	1.000	1.000			
fHV	0.980	0.980		0.980			0.980	0.980	0.980			
fG	1.000	1.000		1.000			1.000	1.000	1.000			
fP	1.000	1.000		1.000			1.000	1.000	1.000			
fBB	1.000	1.000		1.000			1.000	1.000	1.000			
fA	1.000	1.000		1.000			1.000	1.000	1.000			
fLU	0.908	1.000		0.908			1.000	1.000	1.000			
fRT	1.000	0.850		0.964				1.000	0.850			
fLT	1.000			1.000			0.950	1.000				
Sec.												
fLpb	1.000			1.000			1.000	1.000				
fRpb	1.000	1.000		1.000				1.000	1.000			
S	5074	1583		4891			1770	1863	1583			
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2545	5074	#	0.50	0.49	2486	1.02
Right	R	579	1583		0.37	1.00	1583	0.37
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1443	4891		0.30	0.49	2397	0.60
Right								
Northbound								
Prot								
Perm								
Left	L	967	1770	#	0.55	0.43	761	1.27
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.43	801	0.00
Right	R	802	1583		0.51	0.43	681	1.18
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.05
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.14

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	1.02	0.49	30.6	1.000	2486	0.50	24.4	0.0	55.0-	D	44.8	D
R	0.37	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Westbound												
TR	0.60	0.49	22.1	1.000	2397	0.19	0.4	0.0	22.6	C	22.6	C
Northbound												
L	1.27	0.43	34.2	1.000	761	0.50	132.1	0.0	166.3	F		
LTR	0.00	0.43	19.5	1.000	801	0.11	0.0	0.0	19.5	B	149.3	F
R	1.18	0.43	34.2	1.000	681	0.50	94.7	0.0	128.9	F		
Southbound												

Intersection delay = 68.9 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	120.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	30.6	30.6	0.00	14.7	0.0	55.0-
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Westbound								
	0.0						0.0	
TR	0.0	0.00	30.6	22.1	0.00	0.0	0.0	22.6
	0.0						0.0	
Northbound								
L	0.0	0.00	34.2	34.2	0.00	51.5	0.0	166.3
LTR	0.0	0.00	34.2	19.5	0.00	0.0	0.0	19.5
R	0.0	0.00	34.2	34.2	0.00	30.3	0.0	128.9
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 68.9 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound	Northbound			Southbound
LaneGroup	T	R	TR	L	LTR	R	
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate	934	579	529	967	0	802	
So	1900	1900	1900	1900	1900	1900	
No.Lanes	0 3	1	0 3 0	1	1	1	0 0 0
SL	1862	1583	1795	1770	1863	1583	
LnCapacity	912	1583	879	761	801	681	
Flow Ratio	0.5	0.4	0.3	0.5	0.0	0.5	
v/c Ratio	1.02	0.37	0.60	1.27	0.00	1.18	
Grn Ratio	0.49	1.00	0.49	0.43	0.43	0.43	
I Factor	1.000		1.000		1.000		
AT or PVG	3	3	3	3	3	3	
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF2	1.00		1.00	1.00	1.00	1.00	
Q1	31.1		12.8	32.2	0.0	26.7	
kB	0.8	1.1	0.8	0.7	0.7	0.7	
Q2	11.0	0.6	1.1	28.7	0.0	18.6	
Q Average	42.1		13.9	60.9	0.0	45.4	
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage	0	0	0	0	0	0	
Q S Ratio							
70th Percentile Output:							
fB%	1.1		1.2	1.1	1.2	1.1	
BOQ	47.8		16.2	68.3	0.0	51.4	
QSRatio							
85th Percentile Output:							
fB%	1.4		1.5	1.3	1.6	1.4	
BOQ	57.9		20.7	81.6	0.0	62.0	
QSRatio							
90th Percentile Output:							
fB%	1.4		1.6	1.4	1.8	1.4	
BOQ	61.0		22.2	86.4	0.0	65.4	
QSRatio							
95th Percentile Output:							
fB%	1.6		1.8	1.5	2.1	1.5	
BOQ	65.6		24.7	92.6	0.0	70.2	
QSRatio							
98th Percentile Output:							
fB%	1.7		2.0	1.7	2.7	1.7	
BOQ	73.3		28.4	104	0.0	78.5	
QSRatio							

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 NB Ramps

Inter.: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Dyer Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	3	1	0	3	0	1	0	1	0	0	0
LGConfig		T	R		TR		L	LR	R			
Volume		1239	1020		1742	1310	298		111			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru				
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right					EB Right	A			
SB Right					WB Right				
Green	55.1	8.6	0.0			16.7	0.0		
Yellow	4.0	4.0				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	3669	5074	0.36	0.72	5.0	A	3.3	A
R	1583	1583	0.68	1.00	1.2	A		
Westbound								
TR	3433	4747	0.94	0.72	17.0	B	17.0	B
Northbound								
L	311	1770	1.01	0.18	92.6	F		
LR	327	1863	0.00	0.18	32.3	C	77.2	E
R	278	1583	0.42	0.18	35.9	D		
Southbound								

Intersection Delay = 15.9 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Dyer at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 NB Ramps N/S St: Dyer Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1239	1020		1742	1310	298		111			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		326	268		458	345	78		29			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900		1900	1900	1900			
ParkExist												
NumPark												
No. Lanes	0	3	1	0	3	0	1	0	1	0	0	0
LGConfig		T	R		TR		L		LR R			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			
Adj Flow		1304	1074		3213		314	0	117			
%InSharedLn							0		0			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.429			0.000	1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0		0	0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0		0.0	0.0	0.0			
Arriv. Type		3	3		3		3	3	3			
Unit Ext.		3.0	3.0		3.0		3.0	3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0		2.0	2.0	2.0			
Ext of g		2.0	2.0		2.0		2.0	2.0	2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right			
Green	55.1	8.6	0.0		16.7	0.0		
Yellow	4.0	4.0			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1239	1020		1742	1310	298		111			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		1304	1074		1834	1379	314		117			
No. Lanes	0	3	1	0	3	0	1	0	1	0	0	0
Lane group		T	R		TR		L		LR R			
Adj flow		1304	1074		3213		314	0	117			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.429			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound		Northbound			Southbound		
LG	T	R		TR		L	LR	R			
So	1900	1900		1900		1900	1900	1900			
Lanes	0 3	1	0	3	0	1	0	1	0	0	0
fW	1.000	1.000		1.000		1.000	1.000	1.000			
fHV	0.980	0.980		0.980		0.980	0.980	0.980			
fG	1.000	1.000		1.000		1.000	1.000	1.000			
fP	1.000	1.000		1.000		1.000	1.000	1.000			
fBB	1.000	1.000		1.000		1.000	1.000	1.000			
fA	1.000	1.000		1.000		1.000	1.000	1.000			
fLU	0.908	1.000		0.908		1.000	1.000	1.000			
fRT	1.000	0.850		0.936			1.000	0.850			
fLT	1.000			1.000		0.950	1.000				
Sec.											
fLpb	1.000			1.000		1.000	1.000				
fRpb	1.000	1.000		1.000			1.000	1.000			
S	5074	1583		4747		1770	1863	1583			
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1304	5074		0.26	0.72	3669	0.36
Right	R	1074	1583		0.68	1.00	1583	0.68
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	3213	4747	#	0.68	0.72	3433	0.94
Right								
Northbound								
Prot								
Perm								
Left	L	314	1770	#	0.18	0.18	311	1.01
Prot								
Perm								
Thru	LR	0	1863		0.00	0.18	327	0.00
Right	R	117	1583		0.07	0.18	278	0.42
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.85
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.95

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.36	0.72	4.9	1.000	3669	0.11	0.1	0.0	5.0	A	3.3	A
R	0.68	1.00	0.0	0.950	1583	0.25	1.2	0.0	1.2	A		
Westbound												
TR	0.94	0.72	11.3	1.000	3433	0.45	5.7	0.0	17.0	B	17.0	B
Northbound												
L	1.01	0.18	39.1	1.000	311	0.50	53.5	0.0	92.6	F		
LR	0.00	0.18	32.3	1.000	327	0.11	0.0	0.0	32.3	C	77.2	E
R	0.42	0.18	34.8	1.000	278	0.11	1.0	0.0	35.9	D		
Southbound												

Intersection delay = 15.9 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	13.1	4.9	0.00	0.0	0.0	5.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.2
Westbound								
	0.0						0.0	
TR	0.0	0.00	13.1	11.3	0.00	0.0	0.0	17.0
	0.0						0.0	
Northbound								
L	0.0	0.00	39.1	39.1	0.00	0.7	0.0	92.6
LR	0.0	0.00	39.1	32.3	0.00	0.0	0.0	32.3
R	0.0	0.00	39.1	34.8	0.00	0.0	0.0	35.9
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 15.9 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound	Northbound			Southbound
LaneGroup	T	R	TR	L	LR	R	
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate	478	1074	1179	314	0	117	
So	1900	1900	1900	1900	1900	1900	
No.Lanes	0 3	1	0 3 0	1	0	1	0 0 0
SL	1862	1583	1742	1770	1863	1583	
LnCapacity	1346	1583	1260	311	327	278	
Flow Ratio	0.3	0.7	0.7	0.2	0.0	0.1	
v/c Ratio	0.36	0.68	0.94	1.01	0.00	0.42	
Grn Ratio	0.72	1.00	0.72	0.18	0.18	0.18	
I Factor	1.000		1.000		1.000		
AT or PVG	3	3	3	3	3	3	
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF2	1.00		1.00	1.00	1.00	1.00	
Q1	4.7		26.6	8.3	0.0	2.7	
kB	0.9	0.9	0.8	0.4	0.4	0.3	
Q2	0.5	1.9	7.0	3.9	0.0	0.2	
Q Average	5.2		33.7	12.2	0.0	3.0	
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage	0	0	0	0	0	0	
Q S Ratio							
70th Percentile Output:							
fB%	1.2		1.1	1.2	1.2	1.2	
BOQ	6.1		38.5	14.3	0.0	3.6	
QSRatio							
85th Percentile Output:							
fB%	1.6		1.4	1.5	1.6	1.6	
BOQ	8.0		47.1	18.3	0.0	4.7	
QSRatio							
90th Percentile Output:							
fB%	1.7		1.5	1.6	1.8	1.7	
BOQ	8.8		49.6	19.7	0.0	5.2	
QSRatio							
95th Percentile Output:							
fB%	2.0		1.6	1.8	2.1	2.0	
BOQ	10.1		53.6	22.0	0.0	6.0	
QSRatio							
98th Percentile Output:							
fB%	2.4		1.8	2.1	2.7	2.5	
BOQ	12.3		59.8	25.5	0.0	7.4	
QSRatio							

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 SB Ramps

Inter.: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Grand Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Volume				445		349		901			605	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	22.7	0.0			10.9	10.9	0.0	
Yellow	3.6				4.0	4.0		
All Red	1.0				1.0	1.9		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	670	1770	0.70	0.38	19.0	B		
							18.1	B
R	599	1583	0.61	0.38	17.0	B		
Northbound								
T	1584	3547	0.60	0.45	13.2	B	13.2	B
Southbound								
T	2266	5074	0.28	0.45	10.6	B	10.6	B

Intersection Delay = 14.2 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Grand at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 SB Ramps N/S St: Grand Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				445		349		901			605	
% Heavy Veh				2		2		2			2	
PHF				0.95		0.95		0.95			0.95	
PK 15 Vol				117		92		237			159	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900			1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						
Adj Flow				468		367		948			637	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	
Peds Bikes	0			0								
Buses				0		0		0			0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0			0.0	
Arriv. Type				3		3		3			3	
Unit Ext.				3.0		3.0		3.0			3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0			2.0	
Ext of g				2.0		2.0		2.0			2.0	
Ped Min g		3.2			3.2							

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		22.7	0.0			10.9	10.9	0.0
Yellow		3.6				4.0	4.0	
All Red		1.0				1.0	1.9	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				445		349		901			605	
PHF				0.95		0.95		0.95			0.95	
Adj flow				468		367		948			637	
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
Lane group				L		R		T			T	
Adj flow				468		367		948			637	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T			T		
So				1900		1900	1900			1900		
Lanes	0	0	0	1	0	1	0	2	0	0	3	0
fW				1.000		1.000		1.000			1.000	
fHV				0.980		0.980		0.980			0.980	
fG				1.000		1.000		1.000			1.000	
fP				1.000		1.000		1.000			1.000	
fBB				1.000		1.000		1.000			1.000	
fA				1.000		1.000		1.000			1.000	
fLU				1.000		1.000		0.952			0.908	
fRT						0.850		1.000			1.000	
fLT				0.950				1.000			1.000	
Sec.												
fLpb				1.000				1.000			1.000	
fRpb						1.000		1.000			1.000	
S				1770		1583		3547			5074	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	468	1770	#	0.26	0.38	670	0.70
Prot								
Perm								
Thru								
Right	R	367	1583		0.23	0.38	599	0.61
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	948	3547	#	0.27	0.45	1584	0.60
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	637	5074		0.13	0.45	2266	0.28
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.53
Total lost time per cycle, L = 10.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.64

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.70	0.38	15.8	1.000	670	0.26	3.2	0.0	19.0	B		
											18.1	B
R	0.61	0.38	15.1	1.000	599	0.20	1.9	0.0	17.0	B		
Northbound												
T	0.60	0.45	12.5	1.000	1584	0.19	0.6	0.0	13.2	B	13.2	B
Southbound												

T	0.28	0.45	10.5	1.000	2266	0.11	0.1	0.0	10.6	B	10.6	B

Intersection delay = 14.2 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT				0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	18.6	15.8	0.00	0.0	0.0	19.0
	0.0						0.0	
R	0.0	0.00	18.6	15.1	0.00	0.0	0.0	17.0
Northbound								
	0.0						0.0	
T	0.0	0.00	16.6	12.5	0.00	0.0	0.0	13.2
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	16.6	10.5	0.00	0.0	0.0	10.6
	0.0						0.0	

Intersection Delay 14.2 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound		Northbound	Southbound
LaneGroup		L	R	T	T
Init Queue		0.0	0.0	0.0	0.0
Flow Rate		468	367	497	233
So		1900	1900	1900	1900
No.Lanes	0 0 0	1 0	1	0 2 0	0 3 0
SL		1770	1583	1862	1862
LnCapacity		670	599	831	831
Flow Ratio		0.3	0.2	0.3	0.1
v/c Ratio		0.70	0.61	0.60	0.28
Grn Ratio		0.38	0.38	0.45	0.45
I Factor		1.000		1.000	1.000
AT or PVG		3	3	3	3
Pltn Ratio		1.00	1.00	1.00	1.00
PF2		1.00	1.00	1.00	1.00
Q1		6.6	4.9	6.3	2.5
kB		0.4	0.4	0.5	0.5
Q2		0.9	0.6	0.7	0.2
Q Average		7.5	5.6	7.0	2.6
Q Spacing		25.0	25.0	25.0	25.0
Q Storage		0	0	0	0
Q S Ratio					
70th Percentile Output:					
fB%		1.2	1.2	1.2	1.2
BOQ		8.9	6.6	8.2	3.2
QSRatio					
85th Percentile Output:					
fB%		1.5	1.5	1.5	1.6
BOQ		11.6	8.6	10.7	4.2
QSRatio					
90th Percentile Output:					
fB%		1.7	1.7	1.7	1.8
BOQ		12.6	9.5	11.7	4.6
QSRatio					
95th Percentile Output:					
fB%		1.9	1.9	1.9	2.0
BOQ		14.3	10.8	13.3	5.3
QSRatio					
98th Percentile Output:					
fB%		2.3	2.4	2.3	2.5
BOQ		17.0	13.1	15.9	6.7
QSRatio					

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative Baseline No Project
E/W St: SR-55 SB Ramps

Inter.: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Grand Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Volume				330		240		730			710	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right				
Peds					Peds				
WB Left	A				SB Left				
Thru					Thru	A	A		
Right	A				Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	20.5	0.0				19.9	4.1	0.0	
Yellow	3.6					4.0	4.0		
All Red	1.0					1.0	1.9		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
Westbound								
L	605	1770	0.57	0.34	17.5	B		
							16.9	B
R	541	1583	0.47	0.34	16.1	B		
Northbound								
T	1714	3547	0.45	0.48	10.4	B	10.4	B
Southbound								
T	2452	5074	0.30	0.48	9.5	A	9.5	A

Intersection Delay = 11.9 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Grand at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative Baseline No Project

E/W St: SR-55 SB Ramps N/S St: Grand Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				330		240		730			710	
% Heavy Veh				2		2		2			2	
PHF				0.95		0.95		0.95			0.95	
PK 15 Vol				87		63		192			187	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900			1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						
Adj Flow				347		253		768			747	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	
Peds Bikes	0			0								
Buses				0		0		0			0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0			0.0	
Arriv. Type				3		3		3			3	
Unit Ext.				3.0		3.0		3.0			3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0			2.0	
Ext of g				2.0		2.0		2.0			2.0	
Ped Min g		3.2			3.2							

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		20.5	0.0			19.9	4.1	0.0
Yellow		3.6				4.0	4.0	
All Red		1.0				1.0	1.9	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				330		240		730			710	
PHF				0.95		0.95		0.95			0.95	
Adj flow				347		253		768			747	
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
Lane group				L		R		T			T	
Adj flow				347		253		768			747	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T			T		
So				1900		1900	1900			1900		
Lanes	0	0	0	1	0	1	0	2	0	0	3	0
fW				1.000		1.000		1.000			1.000	
fHV				0.980		0.980		0.980			0.980	
fG				1.000		1.000		1.000			1.000	
fP				1.000		1.000		1.000			1.000	
fBB				1.000		1.000		1.000			1.000	
fA				1.000		1.000		1.000			1.000	
fLU				1.000		1.000		0.952			0.908	
fRT						0.850		1.000			1.000	
fLT				0.950				1.000			1.000	
Sec.												
fLpb				1.000				1.000			1.000	
fRpb						1.000		1.000			1.000	
S				1770		1583		3547			5074	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	347	1770	#	0.20	0.34	605	0.57
Prot								
Perm								
Thru								
Right	R	253	1583		0.16	0.34	541	0.47
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	768	3547	#	0.22	0.48	1714	0.45
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	747	5074		0.15	0.48	2452	0.30
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.41
Total lost time per cycle, L = 10.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.50

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.57	0.34	16.2	1.000	605	0.17	1.3	0.0	17.5	B		
											16.9	B
R	0.47	0.34	15.5	1.000	541	0.11	0.6	0.0	16.1	B		
Northbound												
T	0.45	0.48	10.2	1.000	1714	0.11	0.2	0.0	10.4	B	10.4	B
Southbound												

T	0.30	0.48	9.4	1.000	2452	0.11	0.1	0.0	9.5	A	9.5	A

Intersection delay = 11.9 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				

EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.8	16.2	0.00	0.0	0.0	17.5
	0.0						0.0	
R	0.0	0.00	19.8	15.5	0.00	0.0	0.0	16.1
Northbound								
	0.0						0.0	
T	0.0	0.00	15.5	10.2	0.00	0.0	0.0	10.4
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	15.5	9.4	0.00	0.0	0.0	9.5
	0.0						0.0	

Intersection Delay 11.9 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound		Northbound	Southbound
LaneGroup		L	R	T	T
Init Queue		0.0	0.0	0.0	0.0
Flow Rate		347	253	403	274
So		1900	1900	1900	1900
No.Lanes	0 0 0	1 0	1	0 2 0	0 3 0
SL		1770	1583	1862	1862
LnCapacity		605	541	900	900
Flow Ratio		0.2	0.2	0.2	0.1
v/c Ratio		0.57	0.47	0.45	0.30
Grn Ratio		0.34	0.34	0.48	0.48
I Factor		1.000		1.000	1.000
AT or PVG		3	3	3	3
Pltn Ratio		1.00	1.00	1.00	1.00
PF2		1.00	1.00	1.00	1.00
Q1		4.7	3.3	4.4	2.8
kB		0.4	0.4	0.5	0.5
Q2		0.5	0.3	0.4	0.2
Q Average		5.3	3.6	4.8	3.0
Q Spacing		25.0	25.0	25.0	25.0
Q Storage		0	0	0	0
Q S Ratio					
70th Percentile Output:					
fB%		1.2	1.2	1.2	1.2
BOQ		6.3	4.3	5.8	3.6
QSRatio					
85th Percentile Output:					
fB%		1.6	1.6	1.6	1.6
BOQ		8.2	5.7	7.5	4.7
QSRatio					
90th Percentile Output:					
fB%		1.7	1.7	1.7	1.7
BOQ		9.0	6.3	8.3	5.2
QSRatio					
95th Percentile Output:					
fB%		1.9	2.0	2.0	2.0
BOQ		10.3	7.2	9.5	6.0
QSRatio					
98th Percentile Output:					
fB%		2.4	2.5	2.4	2.5
BOQ		12.5	8.9	11.6	7.5
QSRatio					

ERROR MESSAGES

No errors to report.

Appendix I-6 **Post-2030 Cumulative Baseline With Project HCS Intersection Worksheets**

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Volume	514		409					1247	241		2196	322
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	12.6	0.0				16.7	14.7	0.0
Yellow	3.6					3.6	4.3	
All Red	1.5					1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1012	4820	0.53	0.21	21.6	C		
							23.9	C
R	589	2803	0.73	0.21	26.8	C		
Westbound								
Northbound								
T	3087	5074	0.43	0.61	6.3	A	5.3	A
R	1583	1583	0.16	1.00	0.0+	A		
Southbound								
T	3087	5074	0.75	0.61	9.5	A	8.3	A
R	1583	1583	0.21	1.00	0.1	A		

Intersection Delay = 10.3 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	514		409					1247	241		2196	322
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	135		108					328	63		578	85
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	541		431					1313	254		2312	339
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	12.6	0.0			16.7	14.7	0.0	
Yellow	3.6				3.6	4.3		
All Red	1.5				1.5	1.5		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	514		409					1247	241		2196	322
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	541		431					1313	254		2312	339
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
Lane group	L		R					T	R		T	R
Adj flow	541		431					1313	254		2312	339
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound			Southbound	
LG	L		R				T	R		T	R
So	1900		1900				1900	1900		1900	1900
Lanes	3	0	2	0	0	0	3	1	0	3	1
fW	1.000		1.000				1.000	1.000		1.000	1.000
fHV	0.980		0.980				0.980	0.980		0.980	0.980
fG	1.000		1.000				1.000	1.000		1.000	1.000
fP	1.000		1.000				1.000	1.000		1.000	1.000
fBB	1.000		1.000				1.000	1.000		1.000	1.000
fA	1.000		1.000				1.000	1.000		1.000	1.000
fLU	0.908		0.885				0.908	1.000		0.908	1.000
fRT			0.850				1.000	0.850		1.000	0.850
fLT	0.950						1.000			1.000	
Sec.											
fLpb	1.000						1.000			1.000	
fRpb			1.000				1.000	1.000		1.000	1.000
S	4820		2803				5074	1583		5074	1583
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	541	4820		0.11	0.21	1012	0.53
Prot								
Perm								
Thru								
Right	R	431	2803	#	0.15	0.21	589	0.73
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1313	5074		0.26	0.61	3087	0.43
Right	R	254	1583		0.16	1.00	1583	0.16
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2312	5074	#	0.46	0.61	3087	0.75
Right	R	339	1583		0.21	1.00	1583	0.21

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.61
Total lost time per cycle, L = 10.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.74

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.53	0.21	21.1	1.000	1012	0.14	0.6	0.0	21.6	C		
											23.9	C
R	0.73	0.21	22.1	1.000	589	0.29	4.7	0.0	26.8	C		
Westbound												
Northbound												
T	0.43	0.61	6.2	1.000	3087	0.11	0.1	0.0	6.3	A	5.3	A
R	0.16	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Southbound												

T	0.75	0.61	8.5	1.000	3087	0.30	1.0	0.0	9.5	A	8.3	A
R	0.21	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 10.3 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	23.7	21.1	0.00	0.0	0.0	21.6

	0.0						0.0	
R	0.0	0.00	23.7	22.1	0.00	0.0	0.0	26.8
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	11.8	6.2	0.00	0.0	0.0	6.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Southbound								
	0.0						0.0	
T	0.0	0.00	11.8	8.5	0.00	0.0	0.0	9.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 10.3 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	198	243			482	254	848	339
So	1900	1900			1900	1900	1900	1900
No.Lanes	3 0 2		0 0 0		0 3	1	0 3	1
SL	1769	1584			1862	1583	1862	1583
LnCapacity	371	332			1133	1583	1133	1583
Flow Ratio	0.1	0.2			0.3	0.2	0.5	0.2
v/c Ratio	0.53	0.73			0.43	0.16	0.75	0.21
Grn Ratio	0.21	0.21			0.61	1.00	0.61	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	2.9	3.8			4.2		10.2	
kB	0.3	0.3			0.6	0.7	0.6	0.7
Q2	0.3	0.7			0.4	0.1	1.7	0.2
Q Average	3.3	4.5			4.7		11.8	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	3.9	5.3			5.6		13.9	
QSRatio								
85th Percentile Output:								
fB%	1.6	1.6			1.6		1.5	
BOQ	5.1	7.0			7.3		17.8	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.7			1.7		1.6	
BOQ	5.7	7.7			8.0		19.2	
QSRatio								
95th Percentile Output:								
fB%	2.0	2.0			2.0		1.8	
BOQ	6.5	8.8			9.2		21.4	
QSRatio								
98th Percentile Output:								
fB%	2.5	2.4			2.4		2.1	
BOQ	8.1	10.8			11.2		24.9	
QSRatio								

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Volume	1018		941					2022	300		1499	250
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	27.3	0.0				7.8	23.9	0.0	
Yellow	3.6					3.6	4.3		
All Red	1.5					1.5	1.5		

Cycle Length: 75.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1754	4820	0.61	0.36	20.1	C		
							32.1	C
R	1020	2803	0.97	0.36	45.0	D		
Westbound								
Northbound								
T	2490	5074	0.85	0.49	19.9	B	17.3	B
R	1583	1583	0.20	1.00	0.1	A		
Southbound								
T	2490	5074	0.63	0.49	14.7	B	12.6	B
R	1583	1583	0.17	1.00	0.0+	A		

Intersection Delay = 20.7 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Culver at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	1018		941					2022	300		1499	250
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	268		248					532	79		394	66
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	1072		991					2128	316		1578	263
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	27.3	0.0			7.8	23.9	0.0	
Yellow	3.6				3.6	4.3		
All Red	1.5				1.5	1.5		

Cycle Length: 75.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	1018		941					2022	300		1499	250
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	1072		991					2128	316		1578	263
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
Lane group	L		R					T	R		T	R
Adj flow	1072		991					2128	316		1578	263
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound	
LG	L		R				T	R		T	R
So	1900		1900				1900	1900		1900	1900
Lanes	3	0	2	0	0	0	3	1	0	3	1
fW	1.000		1.000				1.000	1.000		1.000	1.000
fHV	0.980		0.980				0.980	0.980		0.980	0.980
fG	1.000		1.000				1.000	1.000		1.000	1.000
fP	1.000		1.000				1.000	1.000		1.000	1.000
fBB	1.000		1.000				1.000	1.000		1.000	1.000
fA	1.000		1.000				1.000	1.000		1.000	1.000
fLU	0.908		0.885				0.908	1.000		0.908	1.000
fRT			0.850				1.000	0.850		1.000	0.850
fLT	0.950						1.000			1.000	
Sec.											
fLpb	1.000						1.000			1.000	
fRpb			1.000				1.000	1.000		1.000	1.000
S	4820		2803				5074	1583		5074	1583
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	1072	4820		0.22	0.36	1754	0.61
Prot								
Perm								
Thru								
Right	R	991	2803	#	0.35	0.36	1020	0.97
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2128	5074	#	0.42	0.49	2490	0.85
Right	R	316	1583		0.20	1.00	1583	0.20
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1578	5074		0.31	0.49	2490	0.63
Right	R	263	1583		0.17	1.00	1583	0.17

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.77
Total lost time per cycle, L = 10.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.90

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.61	0.36	19.5	1.000	1754	0.20	0.6	0.0	20.1	C		
											32.1	C
R	0.97	0.36	23.5	1.000	1020	0.48	21.5	0.0	45.0	D		
Westbound												
Northbound												
T	0.85	0.49	16.8	1.000	2490	0.39	3.1	0.0	19.9	B	17.3	B
R	0.20	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.63	0.49	14.1	1.000	2490	0.21	0.5	0.0	14.7	B	12.6	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		

Intersection delay = 20.7 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	75.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	23.9	19.5	0.00	0.0	0.0	20.1

	0.0						0.0	
R	0.0	0.00	23.9	23.5	0.00	0.0	0.0	45.0
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	19.1	16.8	0.00	0.0	0.0	19.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	19.1	14.1	0.00	0.0	0.0	14.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+

Intersection Delay 20.7 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	393	559			781	316	579	263
So	1900	1900			1900	1900	1900	1900
No.Lanes	3 0	2	0 0	0	3	1	3	1
SL	1769	1584			1862	1583	1862	1583
LnCapacity	643	576			914	1583	914	1583
Flow Ratio	0.2	0.4			0.4	0.2	0.3	0.2
v/c Ratio	0.61	0.97			0.85	0.20	0.63	0.17
Grn Ratio	0.36	0.36			0.49	1.00	0.49	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	6.7	11.5			14.3		8.9	
kB	0.5	0.4			0.6	0.8	0.6	0.8
Q2	0.7	4.6			2.9	0.2	1.0	0.2
Q Average	7.4	16.1			17.2		9.9	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	8.8	18.7			20.0		11.7	
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5			1.5		1.5	
BOQ	11.4	23.7			25.3		15.0	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.6			1.6		1.6	
BOQ	12.4	25.4			27.0		16.3	
QSRatio								
95th Percentile Output:								
fB%	1.9	1.7			1.7		1.8	
BOQ	14.1	28.0			29.8		18.3	
QSRatio								
98th Percentile Output:								
fB%	2.3	2.0			2.0		2.2	
BOQ	16.8	32.0			33.8		21.5	
QSRatio								

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 NB Ramps

Inter.: Jamboree at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Volume				1112	0	503		1317	680		1868	470
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left		A			SB Left				
Thru		A			Thru	A	A		
Right		A			Right	A	A		
Peds					Peds				
NB Right		A			EB Right				
SB Right		A			WB Right				
Green		49.1	0.0			14.4	6.3	0.0	
Yellow		3.6				4.3	4.3		
All Red		1.0				1.0	1.0		

Cycle Length: 85.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1022	1770	1.15	0.58	95.3	F		
LTR	1076	1863	0.00	0.58	7.6	A	69.5	E
R	914	1583	0.58	0.58	12.3	B		
Northbound								
T	2069	6765	0.67	0.31	26.6	C	17.6	B
R	1583	1583	0.45	1.00	0.2	A		
Southbound								
T	2069	6765	0.95	0.31	39.3	D	31.4	C
R	1583	1583	0.31	1.00	0.1	A		

Intersection Delay = 37.1 (sec/veh) Intersection LOS = D

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1112	0	503		1317	680		1868	470
% Heavy Veh				2	2	2		2	2		2	2
PHF				0.95	0.92	0.95		0.95	0.95		0.95	0.95
PK 15 Vol				293	0	132		347	179		492	124
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0		12.0	12.0
RTOR Vol						0				0			0
Adj Flow				1171	0	529			1386	716		1966	495
%InSharedLn				0		0							
Prop LTs					0.000				0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000	
Peds Bikes	0				0			0			0		
Buses				0	0	0			0	0		0	0
%InProtPhase													

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0		0.0	0.0
Arriv. Type				3	3	3		3	3		3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	49.1	0.0			14.4	6.3	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 85.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1112	0	503		1317	680		1868	470
PHF				0.95	0.92	0.95		0.95	0.95		0.95	0.95
Adj flow				1171	0	529		1386	716		1966	495
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
Lane group				L		LTR	R		T	R		T	R
Adj flow				1171	0	529			1386	716		1966	495
Prop LTs					0.000				0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG			L	LTR	R		T	R		T	R	
So			1900	1900	1900		1900	1900		1900	1900	
Lanes	0	0	1	1	1	0	4	1	0	4	1	
fW			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fHV			0.980	0.980	0.980		0.980	0.980		0.980	0.980	
fG			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fP			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fBB			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fA			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fLU			1.000	1.000	1.000		0.908	1.000		0.908	1.000	
fRT				1.000	0.850		1.000	0.850		1.000	0.850	
fLT			0.950	1.000			1.000			1.000		
Sec.												
fLpb			1.000	1.000			1.000			1.000		
fRpb				1.000	1.000		1.000	1.000		1.000	1.000	
S			1770	1863	1583		6765	1583		6765	1583	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	1171	1770	#	0.66	0.58	1022	1.15
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.58	1076	0.00
Right	R	529	1583		0.33	0.58	914	0.58
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1386	6765		0.20	0.31	2069	0.67
Right	R	716	1583		0.45	1.00	1583	0.45
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1966	6765	#	0.29	0.31	2069	0.95
Right	R	495	1583		0.31	1.00	1583	0.31

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.95
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.08

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor Del k	d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.15	0.58	18.0	1.000	1022	0.50	77.3	0.0	95.3	F		
LTR	0.00	0.58	7.6	1.000	1076	0.11	0.0	0.0	7.6	A	69.5	E
R	0.58	0.58	11.4	1.000	914	0.17	0.9	0.0	12.3	B		
Northbound												
T	0.67	0.31	25.8	1.000	2069	0.24	0.9	0.0	26.6	C	17.6	B
R	0.45	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												
T	0.95	0.31	28.9	1.000	2069	0.46	10.4	0.0	39.3	D	31.4	C

R 0.31 1.00 0.0 0.950 1583 0.11 0.1 0.0 0.1 A

Intersection delay = 37.1 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 85.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 85.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				

fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

			EBLT	WBLT	NBLT	SBLT
Cycle length, C	85.0	sec				
Adj. LT vol from Vol Adjustment Worksheet, v						
v/c ratio from Capacity Worksheet, X						
Protected phase effective green interval, g (s)						
Opposing queue effective green interval, gq						
Unopposed green interval, gu						
Red time r=(C-g-gq-gu)						
Arrival rate, qa=v/(3600(max[X,1.0]))						
Protected ph. departure rate, Sp=s/3600						
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)						
XPerm						
XProt						
Case						
Queue at beginning of green arrow, Qa						
Queue at beginning of unsaturated green, Qu						
Residual queue, Qr						
Uniform Delay, d1						

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	

	0.0						0.0	
Westbound								
L	0.0	0.00	18.0	18.0	0.00	37.3	0.0	95.3
LTR	0.0	0.00	18.0	7.6	0.00	0.0	0.0	7.6
R	0.0	0.00	18.0	11.4	0.00	0.0	0.0	12.3
Northbound								
	0.0						0.0	
T	0.0	0.00	29.5	25.8	0.00	0.0	0.0	26.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	29.5	28.9	0.00	0.0	0.0	39.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 37.1 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	LTR	R	T	R		T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate				1171	0	529	381	716		541	495	
So				1900	1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0	1	1	1	0 4	1	0	4	1	
SL				1770	1863	1583	1862	1583		1862	1583	
LnCapacity				1022	1076	914	569	1583		569	1583	
Flow Ratio				0.7	0.0	0.3	0.2	0.5		0.3	0.3	
v/c Ratio				1.15	0.00	0.58	0.67	0.45		0.95	0.31	
Grn Ratio				0.58	0.58	0.58	0.31	1.00		0.31	1.00	
I Factor					1.000		1.000			1.000		
AT or PVG				3	3	3	3	3		3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
PF2				1.00	1.00	1.00	1.00			1.00		
Q1				27.6	0.0	7.9	7.9			12.5		
kB				0.7	0.7	0.6	0.5	0.9		0.5	0.9	
Q2				22.9	0.0	0.9	0.9	0.7		4.2	0.4	
Q Average				50.6	0.0	8.8	8.8			16.7		
Q Spacing				25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage				0	0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.1	1.2	1.2	1.2			1.2		
BOQ				57.1	0.0	10.4	10.4			19.5		
QSRatio												
85th Percentile Output:												
fB%				1.4	1.6	1.5	1.5			1.5		
BOQ				68.6	0.0	13.4	13.4			24.6		
QSRatio												
90th Percentile Output:												
fB%				1.4	1.8	1.7	1.7			1.6		
BOQ				72.4	0.0	14.6	14.6			26.3		
QSRatio												
95th Percentile Output:												
fB%				1.5	2.1	1.9	1.9			1.7		
BOQ				77.7	0.0	16.4	16.4			29.0		
QSRatio												
98th Percentile Output:												
fB%				1.7	2.7	2.2	2.2			2.0		
BOQ				87.0	0.0	19.4	19.4			33.0		
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 NB Ramps

Inter.: Jamboree at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Volume				382	0	995		2595	710		1718	480
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left	A				SB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	46.2	0.0				13.4	20.3	0.0	
Yellow	3.6					4.3	4.3		
All Red	1.0					1.0	1.0		

Cycle Length: 95.1 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	860	1770	0.47	0.49	16.7	B		
LTR	905	1863	0.00	0.49	12.6	B	145.9	F
R	769	1583	1.36	0.49	195.5	F		
Northbound								
T	2774	6765	0.98	0.41	41.5	D	32.6	C
R	1583	1583	0.47	1.00	0.2	A		
Southbound								
T	2774	6765	0.65	0.41	23.1	C	18.1	B
R	1583	1583	0.32	1.00	0.1	A		

Intersection Delay = 50.6 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Jamboree at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				382	0	995		2595	710		1718	480
% Heavy Veh				2	2	2		2	2		2	2
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
PK 15 Vol				101	0	262		683	187		452	126
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0		12.0	12.0
RTOR Vol						0				0			0
Adj Flow				402	0	1047		2732	747		1808	505
%InSharedLn				0		0						
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0		0.0	0.0
Arriv. Type				3	3	3		3	3		3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		46.2	0.0			13.4	20.3	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 95.1 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				382	0	995		2595	710		1718	480
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
Adj flow				402	0	1047		2732	747		1808	505
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
Lane group				L		LTR	R		T	R		T	R
Adj flow				402	0	1047		2732	747		1808	505
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L	LTR	R		T	R		T	R	
So			1900	1900	1900		1900	1900		1900	1900	
Lanes	0	0	1	1	1	0	4	1	0	4	1	
fW			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fHV			0.980	0.980	0.980		0.980	0.980		0.980	0.980	
fG			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fP			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fBB			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fA			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fLU			1.000	1.000	1.000		0.908	1.000		0.908	1.000	
fRT				1.000	0.850		1.000	0.850		1.000	0.850	
fLT			0.950	1.000			1.000			1.000		
Sec.												
fLpb			1.000	1.000			1.000			1.000		
fRpb				1.000	1.000		1.000	1.000		1.000	1.000	
S			1770	1863	1583		6765	1583		6765	1583	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	402	1770		0.23	0.49	860	0.47
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.49	905	0.00
Right	R	1047	1583	#	0.66	0.49	769	1.36
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2732	6765	#	0.40	0.41	2774	0.98
Right	R	747	1583		0.47	1.00	1583	0.47
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1808	6765		0.27	0.41	2774	0.65
Right	R	505	1583		0.32	1.00	1583	0.32

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.07
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.19

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.47	0.49	16.3	1.000	860	0.11	0.4	0.0	16.7	B		
LTR	0.00	0.49	12.6	1.000	905	0.11	0.0	0.0	12.6	B	145.9	F
R	1.36	0.49	24.5	1.000	769	0.50	171.1	0.0	195.5	F		
Northbound												
T	0.98	0.41	27.8	1.000	2774	0.49	13.7	0.0	41.5	D	32.6	C
R	0.47	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.65	0.41	22.6	1.000	2774	0.23	0.6	0.0	23.1	C	18.1	B
R	0.32	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 50.6 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.1 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.1 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.1 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	24.5	16.3	0.00	0.0	0.0	16.7
LTR	0.0	0.00	24.5	12.6	0.00	0.0	0.0	12.6
R	0.0	0.00	24.5	24.5	0.00	69.5	0.0	195.5
Northbound								
	0.0						0.0	
T	0.0	0.00	28.1	27.8	0.00	0.0	0.0	41.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	28.1	22.6	0.00	0.0	0.0	23.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 50.6 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup				L	LTR	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				402	0	1047	752	747	497	505
So				1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	1	1	1	0 4	1	0 4	1
SL				1770	1863	1583	1862	1583	1862	1583
LnCapacity				860	905	769	763	1583	763	1583
Flow Ratio				0.2	0.0	0.7	0.4	0.5	0.3	0.3
v/c Ratio				0.47	0.00	1.36	0.99	0.47	0.65	0.32
Grn Ratio				0.49	0.49	0.49	0.41	1.00	0.41	1.00
I Factor					1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00	1.00		1.00	
Q1				7.1	0.0	27.7	19.7		10.6	
kB				0.7	0.7	0.6	0.6	0.9	0.6	0.9
Q2				0.6	0.0	36.9	6.9	0.8	1.1	0.4
Q Average				7.6	0.0	64.6	26.6		11.7	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%				1.2	1.2	1.1	1.2		1.2	
BOQ				9.0	0.0	72.3	30.6		13.7	
QSRatio										
85th Percentile Output:										
fB%				1.5	1.6	1.3	1.4		1.5	
BOQ				11.7	0.0	86.2	37.8		17.5	
QSRatio										
90th Percentile Output:										
fB%				1.7	1.8	1.4	1.5		1.6	
BOQ				12.8	0.0	91.4	40.0		18.9	
QSRatio										
95th Percentile Output:										
fB%				1.9	2.1	1.5	1.6		1.8	
BOQ				14.4	0.0	97.9	43.5		21.2	
QSRatio										
98th Percentile Output:										
fB%				2.3	2.7	1.7	1.8		2.1	
BOQ				17.2	0.0	110	48.6		24.6	
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Volume	465		965					1527	390		2197	626
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	24.4	0.0				7.8	12.6	0.0	
Yellow	3.6					4.3	4.3		
All Red	1.0					1.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1398	3437	0.35	0.41	12.5	B		
							21.4	C
R	1140	2803	0.89	0.41	25.6	C		
Westbound								
Northbound								
T	2898	6765	0.55	0.43	13.1	B	10.4	B
R	1583	1583	0.26	1.00	0.1	A		
Southbound								
T	2898	6765	0.80	0.43	16.5	B	12.9	B
R	1583	1583	0.42	1.00	0.2	A		

Intersection Delay = 14.1 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	465		965					1527	390		2197	626
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	122		254					402	103		578	165
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	489		1016					1607	411		2313	659
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	24.4	0.0			7.8	12.6	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	465		965					1527	390		2197	626
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	489		1016					1607	411		2313	659
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
Lane group	L		R					T	R		T	R
Adj flow	489		1016					1607	411		2313	659
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound					Westbound					Northbound			Southbound	
LG	L		R								T	R		T	R
So	1900		1900								1900	1900		1900	1900
Lanes	2	0	2	0	0	0	0				4	1	0	4	1
fW	1.000		1.000								1.000	1.000		1.000	1.000
fHV	0.980		0.980								0.980	0.980		0.980	0.980
fG	1.000		1.000								1.000	1.000		1.000	1.000
fP	1.000		1.000								1.000	1.000		1.000	1.000
fBB	1.000		1.000								1.000	1.000		1.000	1.000
fA	1.000		1.000								1.000	1.000		1.000	1.000
fLU	0.971		0.885								0.908	1.000		0.908	1.000
fRT			0.850								1.000	0.850		1.000	0.850
fLT	0.950										1.000			1.000	
Sec.															
fLpb	1.000										1.000			1.000	
fRpb			1.000								1.000	1.000		1.000	1.000
S	3437		2803								6765	1583		6765	1583
Sec.															

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	489	3437		0.14	0.41	1398	0.35
Prot								
Perm								
Thru								
Right	R	1016	2803	#	0.36	0.41	1140	0.89
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1607	6765		0.24	0.43	2898	0.55
Right	R	411	1583		0.26	1.00	1583	0.26
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2313	6765	#	0.34	0.43	2898	0.80
Right	R	659	1583		0.42	1.00	1583	0.42

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.70
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.84

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.35	0.41	12.3	1.000	1398	0.11	0.2	0.0	12.5	B		
											21.4	C
R	0.89	0.41	16.6	1.000	1140	0.42	9.1	0.0	25.6	C		
Westbound												
Northbound												
T	0.55	0.43	12.9	1.000	2898	0.15	0.2	0.0	13.1	B	10.4	B
R	0.26	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.80	0.43	14.9	1.000	2898	0.34	1.7	0.0	16.5	B	12.9	B
R	0.42	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 14.1 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT				0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	17.8	12.3	0.00	0.0	0.0	12.5

	0.0						0.0	
R	0.0	0.00	17.8	16.6	0.00	0.0	0.0	25.6
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	17.1	12.9	0.00	0.0	0.0	13.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	17.1	14.9	0.00	0.0	0.0	16.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 14.1 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	251	574			442	411	636	659
So	1900	1900			1900	1900	1900	1900
No.Lanes	2 0 2		0 0 0		0 4	1	0 4	1
SL	1770	1584			1862	1583	1862	1583
LnCapacity	719	644			797	1583	797	1583
Flow Ratio	0.1	0.4			0.2	0.3	0.3	0.4
v/c Ratio	0.35	0.89			0.55	0.26	0.80	0.42
Grn Ratio	0.41	0.41			0.43	1.00	0.43	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	2.9	8.9			5.5		9.2	
kB	0.4	0.4			0.5	0.7	0.5	0.7
Q2	0.2	2.6			0.6	0.2	1.7	0.5
Q Average	3.1	11.5			6.1		10.9	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	3.7	13.5			7.2		12.8	
QSRatio								
85th Percentile Output:								
fB%	1.6	1.5			1.5		1.5	
BOQ	4.9	17.3			9.4		16.5	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.6			1.7		1.6	
BOQ	5.5	18.7			10.3		17.8	
QSRatio								
95th Percentile Output:								
fB%	2.0	1.8			1.9		1.8	
BOQ	6.3	20.9			11.8		20.0	
QSRatio								
98th Percentile Output:								
fB%	2.5	2.1			2.3		2.1	
BOQ	7.8	24.3			14.2		23.3	
QSRatio								

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Analyst: PB
Agency: Parsons Brinckerhof
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Volume	696		816					2524	1070		1594	510
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	20.2	0.0			17.5	7.1	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1157	3437	0.63	0.34	17.9	B		
							25.3	C
R	944	2803	0.91	0.34	31.7	C		
Westbound								
Northbound								
T	3371	6765	0.79	0.50	13.7	B	10.1	B
R	1583	1583	0.71	1.00	1.5	A		
Southbound								
T	3371	6765	0.50	0.50	10.2	B	7.7	A
R	1583	1583	0.34	1.00	0.1	A		

Intersection Delay = 12.6 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhof
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Jamboree at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	696		816					2524	1070		1594	510
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	183		215					664	282		419	134
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	733		859					2657	1126		1678	537
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	20.2	0.0			17.5	7.1	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	696		816					2524	1070		1594	510
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	733		859					2657	1126		1678	537
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
Lane group	L		R					T	R		T	R
Adj flow	733		859					2657	1126		1678	537
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound					Westbound					Northbound			Southbound	
LG	L		R								T	R		T	R
So	1900		1900								1900	1900		1900	1900
Lanes	2	0	2	0	0	0	0				4	1	0	4	1
fW	1.000		1.000								1.000	1.000		1.000	1.000
fHV	0.980		0.980								0.980	0.980		0.980	0.980
fG	1.000		1.000								1.000	1.000		1.000	1.000
fP	1.000		1.000								1.000	1.000		1.000	1.000
fBB	1.000		1.000								1.000	1.000		1.000	1.000
fA	1.000		1.000								1.000	1.000		1.000	1.000
fLU	0.971		0.885								0.908	1.000		0.908	1.000
fRT			0.850								1.000	0.850		1.000	0.850
fLT	0.950										1.000			1.000	
Sec.															
fLpb	1.000										1.000			1.000	
fRpb			1.000								1.000	1.000		1.000	1.000
S	3437		2803								6765	1583		6765	1583
Sec.															

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	733	3437		0.21	0.34	1157	0.63
Prot								
Perm								
Thru								
Right	R	859	2803		0.31	0.34	944	0.91
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2657	6765		0.39	0.50	3371	0.79
Right	R	1126	1583	#	0.71	1.00	1583	0.71
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1678	6765		0.25	0.50	3371	0.50
Right	R	537	1583		0.34	1.00	1583	0.34

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.71
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.71

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.63	0.34	16.8	1.000	1157	0.21	1.1	0.0	17.9	B		
											25.3	C
R	0.91	0.34	19.0	1.000	944	0.43	12.6	0.0	31.7	C		
Westbound												
Northbound												
T	0.79	0.50	12.4	1.000	3371	0.33	1.3	0.0	13.7	B	10.1	B
R	0.71	1.00	0.0	0.950	1583	0.27	1.5	0.0	1.5	A		
Southbound												

T	0.50	0.50	10.0	1.000	3371	0.11	0.1	0.0	10.2	B	7.7	A
R	0.34	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 12.6 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	19.9	16.8	0.00	0.0	0.0	17.9

	0.0						0.0	
R	0.0	0.00	19.9	19.0	0.00	0.0	0.0	31.7
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	15.0	12.4	0.00	0.0	0.0	13.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.5
Southbound								
	0.0						0.0	
T	0.0	0.00	15.0	10.0	0.00	0.0	0.0	10.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 12.6 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	377	485			731	1126	462	537
So	1900	1900			1900	1900	1900	1900
No.Lanes	2 0 2		0 0 0		0 4	1	0 4	1
SL	1770	1584			1862	1583	1862	1583
LnCapacity	595	533			928	1583	928	1583
Flow Ratio	0.2	0.3			0.4	0.7	0.2	0.3
v/c Ratio	0.63	0.91			0.79	0.71	0.50	0.34
Grn Ratio	0.34	0.34			0.50	1.00	0.50	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	5.3	7.7			10.1		5.1	
kB	0.4	0.4			0.5	0.7	0.5	0.7
Q2	0.7	2.6			1.8	1.7	0.5	0.4
Q Average	6.0	10.3			11.9		5.6	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	7.1	12.2			13.9		6.7	
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5			1.5		1.5	
BOQ	9.2	15.6			17.8		8.7	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.6			1.6		1.7	
BOQ	10.1	16.9			19.2		9.6	
QSRatio								
95th Percentile Output:								
fB%	1.9	1.8			1.8		1.9	
BOQ	11.5	19.0			21.5		10.9	
QSRatio								
98th Percentile Output:								
fB%	2.3	2.2			2.1		2.3	
BOQ	13.9	22.2			24.9		13.3	
QSRatio								

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 NB Ramps

Inter.: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L		T			T R
Volume	146	0	423				328	914			2467	42
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right	A				WB Right				
Green	29.1	0.0				13.1	54.2	7.7	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 125.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	412	1770	0.37	0.23	40.9	D		
LTR	434	1863	0.00	0.23	36.8	D	132.0	F
R	369	1583	1.21	0.23	163.5	F		
Westbound								
Northbound								
L	360	3437	0.96	0.10	92.2	F		
T	3450	5074	0.28	0.68	7.9	A	30.2	C
Southbound								
T	2748	5074	0.95	0.54	34.7	C	34.1	C
R	1583	1583	0.03	1.00	0.0+	A		

Intersection Delay = 45.9 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Tustin Ranch at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 NB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	146	0	423				328	914			2467	42
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	38	0	111				86	241			649	11
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	154	0	445				345	962			2597	44
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru	A	A	A
Right		A			Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right		A			WB Right			
Green		29.1	0.0			13.1	54.2	7.7	0.0
Yellow		3.6				3.2	4.3	4.3	
All Red		1.5				1.0	1.5	1.5	

Cycle Length: 125.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	146	0	423				328	914			2467	42
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	154	0	445				345	962			2597	44
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	154	0	445				345	962			2597	44
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound	
LG	L	LTR	R				L	T		T	R
So	1900	1900	1900				1900	1900		1900	1900
Lanes	1	1	1	0	0	0	2	3	0	3	1
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000
fRT		1.000	0.850					1.000		1.000	0.850
fLT	0.950	1.000					0.950	1.000		1.000	
Sec.											
fLpb	1.000	1.000					1.000	1.000		1.000	
fRpb		1.000	1.000					1.000		1.000	1.000
S	1770	1863	1583				3437	5074		5074	1583
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	154	1770		0.09	0.23	412	0.37
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.23	434	0.00
Right	R	445	1583	#	0.28	0.23	369	1.21
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	345	3437	#	0.10	0.10	360	0.96
Prot								
Perm								
Thru	T	962	5074		0.19	0.68	3450	0.28
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2597	5074	#	0.51	0.54	2748	0.95
Right	R	44	1583		0.03	1.00	1583	0.03

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.89
Total lost time per cycle, L = 15.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.02

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.37	0.23	40.3	1.000	412	0.11	0.6	0.0	40.9	D		
LTR	0.00	0.23	36.8	1.000	434	0.11	0.0	0.0	36.8	D	132.0	F
R	1.21	0.23	48.0	1.000	369	0.50	115.6	0.0	163.5	F		
Westbound												
Northbound												
L	0.96	0.10	55.7	1.000	360	0.47	36.5	0.0	92.2	F		
T	0.28	0.68	7.9	1.000	3450	0.11	0.0	0.0	7.9	A	30.2	C
Southbound												

T	0.95	0.54	26.9	1.000	2748	0.46	7.8	0.0	34.7	C	34.1	C
R	0.03	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		

Intersection delay = 45.9 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	125.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	125.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	125.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	48.0	40.3	0.00	0.0	0.0	40.9

LTR	0.0	0.00	48.0	36.8	0.00	0.0	0.0	36.8
R	0.0	0.00	48.0	48.0	0.00	19.0	0.0	163.5
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	56.0	55.7	0.00	0.0	0.0	92.2
T	0.0	0.00	20.0	7.9	0.00	0.0	0.0	7.9
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	28.7	26.9	0.00	0.0	0.0	34.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+

Intersection Delay 45.9 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	154	0	445				177	353		953	44	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	412	434	369				185	1266		1008	1583	
Flow Ratio	0.1	0.0	0.3				0.1	0.2		0.5	0.0	
v/c Ratio	0.37	0.00	1.21				0.96	0.28		0.95	0.03	
Grn Ratio	0.23	0.23	0.23				0.10	0.68		0.54	1.00	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00		
Q1	4.5	0.0	15.5				6.1	4.8		31.1		
kB	0.5	0.5	0.5				0.3	1.0		0.8	1.1	
Q2	0.3	0.0	11.7				2.1	0.4		7.2	0.0	
Q Average	4.8	0.0	27.1				8.3	5.2		38.3		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.1		
BOQ	5.7	0.0	31.2				9.8	6.2		43.5		
QSRatio												
85th Percentile Output:												
fB%	1.6	1.6	1.4				1.5	1.6		1.4		
BOQ	7.4	0.0	38.6				12.6	8.1		52.9		
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8	1.5				1.7	1.7		1.5		
BOQ	8.2	0.0	40.8				13.8	8.9		55.8		
QSRatio												
95th Percentile Output:												
fB%	2.0	2.1	1.6				1.9	1.9		1.6		
BOQ	9.4	0.0	44.3				15.5	10.2		60.1		
QSRatio												
98th Percentile Output:												
fB%	2.4	2.7	1.8				2.2	2.4		1.8		
BOQ	11.4	0.0	49.5				18.4	12.4		67.0		
QSRatio												

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E/W St: I-5 NB Ramps

Inter.: Tustin Ranch at I-5 NB Ramps
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N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	310	0	283				669	1580			987	451
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right	A				WB Right			
Green	14.0	0.0				15.4	5.1	4.6	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	413	1770	0.79	0.23	31.5	C		
LTR	435	1863	0.00	0.23	17.6	B	32.8	C
R	369	1583	0.81	0.23	34.2	C		
Westbound								
Northbound								
L	882	3437	0.80	0.26	26.1	C		
T	2968	5074	0.56	0.59	7.9	A	13.3	B
Southbound								
T	1311	5074	0.79	0.26	24.2	C	16.6	B
R	1583	1583	0.30	1.00	0.1	A		

Intersection Delay = 17.1 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
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Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 NB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	310	0	283				669	1580			987	451
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	82	0	74				176	416			260	119
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	326	0	298				704	1663			1039	475
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A							
EB Thru	A							
EB Right	A							
EB Peds								
WB Left								
WB Thru								
WB Right								
WB Peds								
NB Left					A			
NB Thru					A	A	A	
NB Right								
NB Peds								
SB Left								
SB Thru						A	A	
SB Right					A	A	A	
SB Peds								
NB Right								
SB Right	A							
EB Right								
WB Right								
Green	14.0	0.0			15.4	5.1	4.6	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	1.5				1.0	1.5	1.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	310	0	283				669	1580			987	451
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	326	0	298				704	1663			1039	475
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	326	0	298				704	1663			1039	475
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	326	1770		0.18	0.23	413	0.79
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.23	435	0.00
Right	R	298	1583	#	0.19	0.23	369	0.81
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	704	3437	#	0.20	0.26	882	0.80
Prot								
Perm								
Thru	T	1663	5074		0.33	0.59	2968	0.56
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1039	5074	#	0.20	0.26	1311	0.79
Right	R	475	1583		0.30	1.00	1583	0.30

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.60
Total lost time per cycle, L = 15.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.80

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.79	0.23	21.6	1.000	413	0.34	9.9	0.0	31.5	C		
LTR	0.00	0.23	17.6	1.000	435	0.11	0.0	0.0	17.6	B	32.8	C
R	0.81	0.23	21.7	1.000	369	0.35	12.5	0.0	34.2	C		
Westbound												
Northbound												
L	0.80	0.26	20.8	1.000	882	0.34	5.2	0.0	26.1	C		
T	0.56	0.59	7.7	1.000	2968	0.16	0.2	0.0	7.9	A	13.3	B
Southbound												

T	0.79	0.26	20.8	1.000	1311	0.34	3.4	0.0	24.2	C	16.6	B
R	0.30	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 17.1 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	23.0	21.6	0.00	0.0	0.0	31.5

LTR	0.0	0.00	23.0	17.6	0.00	0.0	0.0	17.6
R	0.0	0.00	23.0	21.7	0.00	0.0	0.0	34.2
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	22.3	20.8	0.00	0.0	0.0	26.1
T	0.0	0.00	12.4	7.7	0.00	0.0	0.0	7.9
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	22.2	20.8	0.00	0.0	0.0	24.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 17.1 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	326	0	298				362	610		381	475	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	0	3	1
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	413	435	369				454	1089		481	1583	
Flow Ratio	0.2	0.0	0.2				0.2	0.3		0.2	0.3	
v/c Ratio	0.79	0.00	0.81				0.80	0.56		0.79	0.30	
Grn Ratio	0.23	0.23	0.23				0.26	0.59		0.26	1.00	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00		
Q1	5.1	0.0	4.7				5.6	6.3		5.9		
kB	0.3	0.3	0.3				0.3	0.6		0.3	0.7	
Q2	1.1	0.0	1.1				1.2	0.7		1.2	0.3	
Q Average	6.2	0.0	5.8				6.8	7.0		7.1		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.2		
BOQ	7.3	0.0	6.9				8.1	8.3		8.4		
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6	1.5				1.5	1.5		1.5		
BOQ	9.6	0.0	9.0				10.5	10.8		11.0		
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8	1.7				1.7	1.7		1.7		
BOQ	10.5	0.0	9.9				11.5	11.8		12.0		
QSRatio												
95th Percentile Output:												
fB%	1.9	2.1	1.9				1.9	1.9		1.9		
BOQ	11.9	0.0	11.2				13.1	13.3		13.6		
QSRatio												
98th Percentile Output:												
fB%	2.3	2.7	2.3				2.3	2.3		2.3		
BOQ	14.4	0.0	13.6				15.7	16.0		16.2		
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	701	0	858				165	942			2328	566
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	51.6	0.0				5.5	47.2	10.3	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 132.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	692	1770	1.07	0.39	93.5	F		
LTR	728	1863	0.00	0.39	24.5	C	182.7	F
R	619	1583	1.46	0.39	255.5	F		
Westbound								
Northbound								
L	143	3437	1.22	0.04	208.3	F		
T	2748	5074	0.36	0.54	17.3	B	45.8	D
Southbound								
T	2395	5074	1.02	0.47	59.4	E	54.8	D
R	747	1583	0.80	0.47	35.6	D		

Intersection Delay = 88.8 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Tustin Ranch at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	701	0	858				165	942			2328	566
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	184	0	226				43	248			613	149
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	738	0	903				174	992			2451	596
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	51.6	0.0				5.5	47.2	10.3	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 132.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	701	0	858				165	942			2328	566
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	738	0	903				174	992			2451	596
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	738	0	903				174	992			2451	596
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	738	1770		0.42	0.39	692	1.07
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.39	728	0.00
Right	R	903	1583	#	0.57	0.39	619	1.46
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	174	3437	#	0.05	0.04	143	1.22
Prot								
Perm								
Thru	T	992	5074		0.20	0.54	2748	0.36
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2451	5074	#	0.48	0.47	2395	1.02
Right	R	596	1583		0.38	0.47	747	0.80

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.10
Total lost time per cycle, L = 12.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.22

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.07	0.39	40.2	1.000	692	0.50	53.3	0.0	93.5	F		
LTR	0.00	0.39	24.5	1.000	728	0.11	0.0	0.0	24.5	C	182.7	F
R	1.46	0.39	40.2	1.000	619	0.50	215.3	0.0	255.5	F		
Westbound												
Northbound												
L	1.22	0.04	63.3	1.000	143	0.50	145.1	0.0	208.3	F		
T	0.36	0.54	17.2	1.000	2748	0.11	0.1	0.0	17.3	B	45.8	D
Southbound												

T	1.02	0.47	34.8	1.000	2395	0.50	24.6	0.0	59.4	E	54.8 D
R	0.80	0.47	29.5	1.000	747	0.34	6.1	0.0	35.6	D	

Intersection delay = 88.8 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 132.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 132.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	132.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	40.2	40.2	0.00	11.5	0.0	93.5

LTR	0.0	0.00	40.2	24.5	0.00	0.0	0.0	24.5
R	0.0	0.00	40.2	40.2	0.00	71.0	0.0	255.5
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	63.3	63.3	0.00	7.7	0.0	208.3
T	0.0	0.00	30.2	17.2	0.00	0.0	0.0	17.3
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	34.8	34.8	0.00	14.0	0.0	59.4
R	0.0	0.00	34.8	29.5	0.00	0.0	0.0	35.6

Intersection Delay 88.8 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	738	0	903				89	364		899	596	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	692	728	619				73	1008		879	747	
Flow Ratio	0.4	0.0	0.6				0.1	0.2		0.5	0.4	
v/c Ratio	1.07	0.00	1.46				1.22	0.36		1.02	0.80	
Grn Ratio	0.39	0.39	0.39				0.04	0.54		0.47	0.47	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
Q1	27.1	0.0	33.1				3.3	7.6		33.0	18.5	
kB	0.7	0.7	0.7				0.2	0.9		0.8	0.7	
Q2	11.4	0.0	37.5				2.7	0.5		10.8	2.5	
Q Average	38.4	0.0	70.6				6.0	8.1		43.8	21.0	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.1				1.2	1.2		1.1	1.2	
BOQ	43.8	0.0	78.8				7.1	9.6		49.6	24.4	
QSRatio												
85th Percentile Output:												
fB%	1.4	1.6	1.3				1.5	1.5		1.4	1.4	
BOQ	53.2	0.0	93.8				9.3	12.4		60.0	30.5	
QSRatio												
90th Percentile Output:												
fB%	1.5	1.8	1.4				1.7	1.7		1.4	1.5	
BOQ	56.1	0.0	99.6				10.2	13.5		63.3	32.4	
QSRatio												
95th Percentile Output:												
fB%	1.6	2.1	1.5				1.9	1.9		1.6	1.7	
BOQ	60.4	0.0	107				11.6	15.2		68.0	35.5	
QSRatio												
98th Percentile Output:												
fB%	1.8	2.7	1.7				2.3	2.2		1.7	1.9	
BOQ	67.4	0.0	120				14.0	18.1		76.0	39.9	
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	577	0	503				249	1774			963	324
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.4	0.0				5.6	5.4	5.2	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 55.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	689	1770	0.88	0.39	28.3	C		
LTR	725	1863	0.00	0.39	10.3	B	27.8	C
R	616	1583	0.86	0.39	27.1	C		
Westbound								
Northbound								
L	350	3437	0.75	0.10	32.7	C		
T	2279	5074	0.82	0.45	15.7	B	17.8	B
Southbound								
T	1421	5074	0.71	0.28	19.5	B	21.2	C
R	443	1583	0.77	0.28	26.2	C		

Intersection Delay = 21.2 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Tustin Ranch at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	577	0	503				249	1774			963	324
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	152	0	132				66	467			253	85
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	607	0	529				262	1867			1014	341
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.4	0.0				5.6	5.4	5.2	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 55.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	577	0	503				249	1774			963	324
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	607	0	529				262	1867			1014	341
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	607	0	529				262	1867			1014	341
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound						Westbound						Northbound						Southbound					
LG	L		LTR	R									L		T				T		R			
So	1900		1900	1900									1900		1900				1900		1900			
Lanes	1		1		0		0		0				2		3		0		0		3		1	
fW	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fHV	0.980		0.980	0.980									0.980		0.980						0.980		0.980	
fG	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fP	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fBB	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fA	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fLU	1.000		1.000	1.000									0.971		0.908						0.908		1.000	
fRT			1.000	0.850											1.000						1.000		0.850	
fLT	0.950		1.000										0.950		1.000						1.000			
Sec.																								
fLpb	1.000		1.000										1.000		1.000						1.000			
fRpb			1.000	1.000											1.000						1.000		1.000	
S	1770		1863	1583									3437		5074						5074		1583	
Sec.																								

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	607	1770	#	0.34	0.39	689	0.88
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.39	725	0.00
Right	R	529	1583		0.33	0.39	616	0.86
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	262	3437		0.08	0.10	350	0.75
Prot								
Perm								
Thru	T	1867	5074	#	0.37	0.45	2279	0.82
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1014	5074		0.20	0.28	1421	0.71
Right	R	341	1583		0.22	0.28	443	0.77

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.71
Total lost time per cycle, L = 8.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.85

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.88	0.39	15.6	1.000	689	0.41	12.7	0.0	28.3	C		
LTR	0.00	0.39	10.3	1.000	725	0.11	0.0	0.0	10.3	B	27.8	C
R	0.86	0.39	15.4	1.000	616	0.39	11.7	0.0	27.1	C		
Westbound												
Northbound												
L	0.75	0.10	24.0	1.000	350	0.30	8.6	0.0	32.7	C		
T	0.82	0.45	13.2	1.000	2279	0.36	2.5	0.0	15.7	B	17.8	B
Southbound												

T	0.71	0.28	17.8	1.000	1421	0.28	1.7	0.0	19.5	B	21.2	C
R	0.77	0.28	18.2	1.000	443	0.32	8.1	0.0	26.2	C		

Intersection delay = 21.2 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	55.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	55.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	55.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	16.8	15.6	0.00	0.0	0.0	28.3

LTR	0.0	0.00	16.8	10.3	0.00	0.0	0.0	10.3
R	0.0	0.00	16.8	15.4	0.00	0.0	0.0	27.1
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	24.7	24.0	0.00	0.0	0.0	32.7
T	0.0	0.00	15.1	13.2	0.00	0.0	0.0	15.7
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	19.8	17.8	0.00	0.0	0.0	19.5
R	0.0	0.00	19.8	18.2	0.00	0.0	0.0	26.2

Intersection Delay 21.2 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	607	0	529				134	685		372	341	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	0 3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	689	725	616				180	836		521	443	
Flow Ratio	0.3	0.0	0.3				0.1	0.4		0.2	0.2	
v/c Ratio	0.88	0.00	0.86				0.74	0.82		0.71	0.77	
Grn Ratio	0.39	0.39	0.39				0.10	0.45		0.28	0.28	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
Q1	8.6	0.0	7.4				2.0	9.1		5.1	4.8	
kB	0.4	0.4	0.4				0.2	0.5		0.3	0.3	
Q2	2.5	0.0	2.0				0.5	1.9		0.8	1.0	
Q Average	11.1	0.0	9.4				2.5	11.0		5.9	5.8	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.2	1.2	
BOQ	13.0	0.0	11.1				3.0	13.0		7.1	6.8	
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6	1.5				1.6	1.5		1.5	1.5	
BOQ	16.7	0.0	14.3				3.9	16.6		9.2	8.9	
QSRatio												
90th Percentile Output:												
fB%	1.6	1.8	1.7				1.8	1.6		1.7	1.7	
BOQ	18.0	0.0	15.5				4.4	18.0		10.1	9.8	
QSRatio												
95th Percentile Output:												
fB%	1.8	2.1	1.9				2.0	1.8		1.9	1.9	
BOQ	20.2	0.0	17.4				5.0	20.1		11.5	11.1	
QSRatio												
98th Percentile Output:												
fB%	2.1	2.7	2.2				2.5	2.1		2.3	2.3	
BOQ	23.5	0.0	20.5				6.3	23.5		13.9	13.5	
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 NB Ramps

Inter.: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
LGConfig				L		LT	R	L	T		T	R
Volume				513	3	344		484	816		1321	580
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.3	0.0				15.3	8.2	9.6	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 70.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	539	1770	1.00	0.30	63.6	E		
LT	567	1863	0.01	0.30	17.0	B	49.4	D
R	482	1583	0.75	0.30	28.5	C		
Northbound								
L	387	1770	1.32	0.22	186.5	F		
T	2965	5074	0.29	0.58	7.3	A	74.0	E
Southbound								
T	1587	5074	0.88	0.31	28.6	C	64.5	E
R	495	1583	1.23	0.31	146.1	F		

Intersection Delay = 64.3 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Redhill Ave at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 NB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				513	3	344	484	816			1321	580
% Heavy Veh				2	2	2	2	2			2	2
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
PK 15 Vol				135	1	91	127	215			348	153
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900	1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
LGConfig				L		LT	R	L		T			T	R
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0	
Adj Flow				540	3	362	509	859			1391	611
%InSharedLn				0								
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000
Peds Bikes	0				0						0	
Buses				0	0	0	0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Arriv. Type				3	3	3	3	3			3	3
Unit Ext.				3.0	3.0	3.0	3.0	3.0			3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ext of g				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru		A	A
Right		A			Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		21.3	0.0			15.3	8.2	9.6	0.0
Yellow		3.2				3.2	3.6	3.6	
All Red		0.5				0.5	0.5	0.5	

Cycle Length: 70.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				513	3	344	484	816			1321	580
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
Adj flow				540	3	362	509	859			1391	611
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
Lane group				L		LT	R	L		T			T	R
Adj flow				540	3	362	509	859			1391	611
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	LT	R	L	T		T	R	
So				1900	1900	1900	1900	1900		1900	1900	
Lanes	0	0	0	1	1	1	1	3	0	3	1	
fW				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fHV				0.980	0.980	0.980	0.980	0.980		0.980	0.980	
fG				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fP				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fBB				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fA				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fLU				1.000	1.000	1.000	1.000	0.908		0.908	1.000	
fRT					1.000	0.850		1.000		1.000	0.850	
fLT				0.950	1.000		0.950	1.000		1.000		
Sec.												
fLpb				1.000	1.000		1.000	1.000		1.000		
fRpb					1.000	1.000		1.000		1.000	1.000	
S				1770	1863	1583	1770	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	540	1770	#	0.31	0.30	539	1.00
Prot								
Perm								
Thru	LT	3	1863		0.00	0.30	567	0.01
Right	R	362	1583		0.23	0.30	482	0.75
Northbound								
Prot								
Perm								
Left	L	509	1770	#	0.29	0.22	387	1.32
Prot								
Perm								
Thru	T	859	5074		0.17	0.58	2965	0.29
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1391	5074		0.27	0.31	1587	0.88
Right	R	611	1583	#	0.39	0.31	495	1.23

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.98
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.17

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.00	0.30	24.4	1.000	539	0.50	39.2	0.0	63.6	E		
LT	0.01	0.30	17.0	1.000	567	0.11	0.0	0.0	17.0	B	49.4	D
R	0.75	0.30	22.0	1.000	482	0.31	6.5	0.0	28.5	C		
Northbound												
L	1.32	0.22	27.4	1.000	387	0.50	159.2	0.0	186.5	F		
T	0.29	0.58	7.3	1.000	2965	0.11	0.1	0.0	7.3	A	74.0	E
Southbound												

T	0.88	0.31	22.8	1.000	1587	0.40	5.9	0.0	28.6	C	64.5	E
R	1.23	0.31	24.0	1.000	495	0.50	122.0	0.0	146.1	F		

Intersection delay = 64.3 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	70.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	70.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	70.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	24.4	24.4	0.00	0.2	0.0	63.6
LT	0.0	0.00	24.4	17.0	0.00	0.0	0.0	17.0
R	0.0	0.00	24.4	22.0	0.00	0.0	0.0	28.5
Northbound								
L	0.0	0.00	27.4	27.4	0.00	30.5	0.0	186.5
T	0.0	0.00	14.5	7.3	0.00	0.0	0.0	7.3
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	24.0	22.8	0.00	0.0	0.0	28.6
R	0.0	0.00	24.0	24.0	0.00	29.0	0.0	146.1

Intersection Delay 64.3 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	LT	R	L	T		T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate				540	3	362	509	315		510	611	
So				1900	1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0	1	1	1	1	3	0	3	1	
SL				1770	1863	1583	1770	1862		1862	1583	
LnCapacity				539	567	482	387	1088		582	495	
Flow Ratio				0.3	0.0	0.2	0.3	0.2		0.3	0.4	
v/c Ratio				1.00	0.01	0.75	1.32	0.29		0.88	1.23	
Grn Ratio				0.30	0.30	0.30	0.22	0.58		0.31	0.31	
I Factor					1.000			1.000		1.000		
AT or PVG				3	3	3	3	3		3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Q1				10.5	0.0	6.3	9.9	3.1		9.4	11.9	
kB				0.4	0.4	0.4	0.3	0.6		0.4	0.4	
Q2				5.3	0.0	1.1	16.5	0.3		2.4	16.3	
Q Average				15.8	0.0	7.4	26.4	3.3		11.8	28.2	
Q Spacing				25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage				0	0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.2	1.2	1.2	1.2	1.2		1.2	1.1	
BOQ				18.5	0.1	8.8	30.4	4.0		13.8	32.4	
QSRatio												
85th Percentile Output:												
fB%				1.5	1.6	1.5	1.4	1.6		1.5	1.4	
BOQ				23.4	0.1	11.4	37.7	5.2		17.7	40.0	
QSRatio												
90th Percentile Output:												
fB%				1.6	1.8	1.7	1.5	1.7		1.6	1.5	
BOQ				25.0	0.1	12.4	39.8	5.8		19.1	42.2	
QSRatio												
95th Percentile Output:												
fB%				1.7	2.1	1.9	1.6	2.0		1.8	1.6	
BOQ				27.7	0.1	14.1	43.3	6.6		21.4	45.8	
QSRatio												
98th Percentile Output:												
fB%				2.0	2.7	2.3	1.8	2.5		2.1	1.8	
BOQ				31.6	0.1	16.8	48.4	8.2		24.8	51.2	
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 NB Ramps

Inter.: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
LGConfig				L		LT	R	L	T		T	R
Volume				399	49	503	459	1041			733	308
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	27.8	0.0				22.4	7.3	6.9	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	615	1770	0.68	0.35	25.4	C		
LT	647	1863	0.08	0.35	17.6	B	40.4	D
R	550	1583	0.96	0.35	54.5	D		
Northbound								
L	496	1770	0.97	0.28	62.1	E		
T	2816	5074	0.39	0.56	10.2	B	26.1	C
Southbound								
T	1161	5074	0.66	0.23	29.5	C	36.6	D
R	362	1583	0.90	0.23	53.5	D		

Intersection Delay = 33.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Redhill Ave at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 NB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				399	49	503	459	1041			733	308
% Heavy Veh				2	2	2	2	2			2	2
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
PK 15 Vol				105	13	132	121	274			193	81
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900	1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
LGConfig				L		LT	R	L		T			T	R
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0	
Adj Flow				420	52	529	483	1096			772	324
%InSharedLn				0								
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000
Peds Bikes	0				0						0	
Buses				0	0	0	0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Arriv. Type				3	3	3	3	3			3	3
Unit Ext.				3.0	3.0	3.0	3.0	3.0			3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ext of g				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	27.8	0.0				22.4	7.3	6.9	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				399	49	503	459	1041			733	308
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
Adj flow				420	52	529	483	1096			772	324
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
Lane group				L		LT	R	L		T			T	R
Adj flow				420	52	529	483	1096			772	324
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG				L	LT	R	L	T		T	R	
So				1900	1900	1900	1900	1900		1900	1900	
Lanes	0	0	0	1	1	1	1	3	0	3	1	
fW				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fHV				0.980	0.980	0.980	0.980	0.980		0.980	0.980	
fG				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fP				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fBB				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fA				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fLU				1.000	1.000	1.000	1.000	0.908		0.908	1.000	
fRT					1.000	0.850		1.000		1.000	0.850	
fLT				0.950	1.000		0.950	1.000		1.000		
Sec.												
fLpb				1.000	1.000		1.000	1.000		1.000		
fRpb					1.000	1.000		1.000		1.000	1.000	
S				1770	1863	1583	1770	5074		5074	1583	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	420	1770		0.24	0.35	615	0.68
Prot								
Perm								
Thru	LT	52	1863		0.03	0.35	647	0.08
Right	R	529	1583	#	0.33	0.35	550	0.96
Northbound								
Prot								
Perm								
Left	L	483	1770	#	0.27	0.28	496	0.97
Prot								
Perm								
Thru	T	1096	5074		0.22	0.56	2816	0.39
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	772	5074		0.15	0.23	1161	0.66
Right	R	324	1583	#	0.20	0.23	362	0.90

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.81
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.95

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.68	0.35	22.3	1.000	615	0.25	3.1	0.0	25.4	C		
LT	0.08	0.35	17.5	1.000	647	0.11	0.1	0.0	17.6	B	40.4	D
R	0.96	0.35	25.6	1.000	550	0.47	28.9	0.0	54.5	D		
Northbound												
L	0.97	0.28	28.5	1.000	496	0.48	33.6	0.0	62.1	E		
T	0.39	0.56	10.1	1.000	2816	0.11	0.1	0.0	10.2	B	26.1	C
Southbound												

T	0.66	0.23	28.1	1.000	1161	0.24	1.5	0.0	29.5	C	36.6	D
R	0.90	0.23	29.9	1.000	362	0.42	23.6	0.0	53.5	D		

Intersection delay = 33.1 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	80.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	80.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	26.1	22.3	0.00	0.0	0.0	25.4
LT	0.0	0.00	26.1	17.5	0.00	0.0	0.0	17.6
R	0.0	0.00	26.1	25.6	0.00	0.0	0.0	54.5
Northbound								
L	0.0	0.00	28.8	28.5	0.00	0.0	0.0	62.1
T	0.0	0.00	17.8	10.1	0.00	0.0	0.0	10.2
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	30.9	28.1	0.00	0.0	0.0	29.5
R	0.0	0.00	30.9	29.9	0.00	0.0	0.0	53.5

Intersection Delay 33.1 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound				Southbound		
LaneGroup				L	LT	R	L	T			T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0			0.0	0.0	
Flow Rate				420	52	529	483	402			283	324	
So				1900	1900	1900	1900	1900			1900	1900	
No.Lanes	0	0	0	1	1	1	1	3	0	0	3	1	
SL				1770	1863	1583	1770	1862			1862	1583	
LnCapacity				615	647	550	496	1033			426	362	
Flow Ratio				0.2	0.0	0.3	0.3	0.2			0.2	0.2	
v/c Ratio				0.68	0.08	0.96	0.97	0.39			0.66	0.90	
Grn Ratio				0.35	0.35	0.35	0.28	0.56			0.23	0.23	
I Factor					1.000			1.000			1.000		
AT or PVG				3	3	3	3	3			3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00			1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00			1.00	1.00	
Q1				8.0	0.8	11.5	10.6	5.1			5.7	7.0	
kB				0.5	0.5	0.4	0.4	0.7			0.4	0.3	
Q2				1.0	0.0	4.3	4.3	0.4			0.7	2.1	
Q Average				9.0	0.8	15.8	14.9	5.5			6.5	9.1	
Q Spacing				25.0	25.0	25.0	25.0	25.0			25.0	25.0	
Q Storage				0	0	0	0	0			0	0	
Q S Ratio													
70th Percentile Output:													
fB%				1.2	1.2	1.2	1.2	1.2			1.2	1.2	
BOQ				10.6	1.0	18.5	17.4	6.5			7.6	10.7	
QSRatio													
85th Percentile Output:													
fB%				1.5	1.6	1.5	1.5	1.5			1.5	1.5	
BOQ				13.7	1.3	23.4	22.1	8.5			9.9	13.8	
QSRatio													
90th Percentile Output:													
fB%				1.7	1.8	1.6	1.6	1.7			1.7	1.7	
BOQ				14.9	1.5	25.0	23.7	9.3			10.9	15.0	
QSRatio													
95th Percentile Output:													
fB%				1.9	2.1	1.7	1.8	1.9			1.9	1.9	
BOQ				16.7	1.7	27.7	26.3	10.7			12.4	16.9	
QSRatio													
98th Percentile Output:													
fB%				2.2	2.6	2.0	2.0	2.4			2.3	2.2	
BOQ				19.8	2.2	31.6	30.1	12.9			14.9	19.9	
QSRatio													

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
LGConfig		LT	R					T	R	L	T	
Volume	245	0	434					1047	605	506	1282	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	23.5	0.0				25.1	7.9	22.9	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	439	1774	0.59	0.25	33.5	C	98.2	F
R	392	1583	1.17	0.25	134.7	F		
Westbound								
Northbound								
T	2485	6765	0.44	0.37	22.8	C	49.5	D
R	582	1583	1.09	0.37	95.8	F		
Southbound								
L	468	1770	1.14	0.26	120.5	F		
T	4536	6765	0.30	0.67	6.5	A	38.8	D

Intersection Delay = 52.9 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Redhill Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	245	0	434					1047	605	506	1282	
% Heavy Veh	2	2	2					2	2	2	2	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
PK 15 Vol	64	0	114					276	159	133	337	
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat		1900	1900					1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
LGConfig		LT	R					T	R	L	T	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			
Adj Flow		258	457					1102	637	533	1349	
%InSharedLn												
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	
Peds Bikes		0			0			0				
Buses		0	0					0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0					0.0	0.0	0.0	0.0	
Arriv. Type		3	3					3	3	3	3	
Unit Ext.		3.0	3.0					3.0	3.0	3.0	3.0	
I Factor		1.000						1.000			1.000	
Lost Time		2.0	2.0					2.0	2.0	2.0	2.0	
Ext of g		2.0	2.0					2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	23.5	0.0			25.1	7.9	22.9	0.0
Yellow	3.2				3.2	3.6	3.6	
All Red	0.5				0.5	0.5	0.5	

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	245	0	434					1047	605	506	1282	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
Adj flow	258	0	457					1102	637	533	1349	
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
Lane group		LT	R					T	R	L	T	
Adj flow		258	457					1102	637	533	1349	
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound			Southbound	
LG	LT	R					T	R	L	T	
So	1900	1900					1900	1900	1900	1900	
Lanes	0 1	0 1	0	0	0	0	4	1	1	4	0
fW	1.000	1.000					1.000	1.000	1.000	1.000	
fHV	0.980	0.980					0.980	0.980	0.980	0.980	
fG	1.000	1.000					1.000	1.000	1.000	1.000	
fP	1.000	1.000					1.000	1.000	1.000	1.000	
fBB	1.000	1.000					1.000	1.000	1.000	1.000	
fA	1.000	1.000					1.000	1.000	1.000	1.000	
fLU	1.000	1.000					0.908	1.000	1.000	0.908	
fRT	1.000	0.850					1.000	0.850		1.000	
fLT	0.952						1.000		0.950	1.000	
Sec.											
fLpb	1.000						1.000		1.000	1.000	
fRpb	1.000	1.000					1.000	1.000		1.000	
S	1774	1583					6765	1583	1770	6765	
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	258	1774		0.15	0.25	439	0.59
Right	R	457	1583	#	0.29	0.25	392	1.17
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1102	6765		0.16	0.37	2485	0.44
Right	R	637	1583	#	0.40	0.37	582	1.09
Southbound								
Prot								
Perm								
Left	L	533	1770	#	0.30	0.26	468	1.14
Prot								
Perm								
Thru	T	1349	6765		0.20	0.67	4536	0.30
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.99
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.13

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
LT	0.59	0.25	31.5	1.000	439	0.18	2.1	0.0	33.5	C	98.2	F
R	1.17	0.25	35.8	1.000	392	0.50	99.0	0.0	134.7	F		
Westbound												
Northbound												
T	0.44	0.37	22.7	1.000	2485	0.11	0.1	0.0	22.8	C	49.5	D
R	1.09	0.37	30.1	1.000	582	0.50	65.7	0.0	95.8	F		
Southbound												
L	1.14	0.26	35.0	1.000	468	0.50	85.5	0.0	120.5	F		

T	0.30	0.67	6.4	1.000	4536	0.11	0.0	0.0	6.5	A	38.8	D

Intersection delay = 52.9 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	1.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

LT	0.0	0.00	35.8	31.5	0.00	0.0	0.0	33.5
R	0.0	0.00	35.8	35.8	0.00	16.2	0.0	134.7
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	30.1	22.7	0.00	0.0	0.0	22.8
R	0.0	0.00	30.1	30.1	0.00	13.8	0.0	95.8
Southbound								
L	0.0	0.00	35.0	35.0	0.00	16.2	0.0	120.5
T	0.0	0.00	15.7	6.4	0.00	0.0	0.0	6.5
	0.0						0.0	

Intersection Delay 52.9 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup		LT	R				T	R		L	T	
Init Queue		0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate		258	457				303	637		533	371	
So		1900	1900				1900	1900		1900	1900	
No.Lanes	0	1	1	0	0	0	0	4	1	1	4	0
SL		1774	1583				1862	1583		1770	1862	
LnCapacity		439	392				684	582		468	1248	
Flow Ratio		0.1	0.3				0.2	0.4		0.3	0.2	
v/c Ratio		0.59	1.17				0.44	1.09		1.14	0.30	
Grn Ratio		0.25	0.25				0.37	0.37		0.26	0.67	
I Factor		1.000					1.000				1.000	
AT or PVG		3	3				3	3		3	3	
Pltn Ratio		1.00	1.00				1.00	1.00		1.00	1.00	
PF2		1.00	1.00				1.00	1.00		1.00	1.00	
Q1		6.0	12.1				6.0	16.8		14.1	4.0	
kB		0.4	0.4				0.6	0.5		0.5	0.8	
Q2		0.6	10.4				0.4	10.7		10.9	0.3	
Q Average		6.6	22.4				6.5	27.5		25.0	4.4	
Q Spacing		25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage		0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%		1.2	1.2				1.2	1.2		1.2	1.2	
BOQ		7.8	25.9				7.7	31.6		28.8	5.2	
QSRatio												
85th Percentile Output:												
fB%		1.5	1.4				1.5	1.4		1.4	1.6	
BOQ		10.2	32.3				10.0	39.1		35.7	6.8	
QSRatio												
90th Percentile Output:												
fB%		1.7	1.5				1.7	1.5		1.5	1.7	
BOQ		11.1	34.3				11.0	41.3		37.8	7.5	
QSRatio												
95th Percentile Output:												
fB%		1.9	1.7				1.9	1.6		1.6	2.0	
BOQ		12.6	37.5				12.4	44.9		41.2	8.6	
QSRatio												
98th Percentile Output:												
fB%		2.3	1.9				2.3	1.8		1.8	2.4	
BOQ		15.2	42.1				15.0	50.1		46.1	10.6	
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
LGConfig		LT	R					T	R	L	T	
Volume	412	0	332					1088	537	383	738	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.0	0.0				18.6	10.9	13.9	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	466	1774	0.93	0.26	54.4	D	48.9	D
R	416	1583	0.84	0.26	42.0	D		
Westbound								
Northbound								
T	2444	6765	0.47	0.36	19.8	B	33.0	C
R	572	1583	0.99	0.36	59.8	E		
Southbound								
L	412	1770	0.98	0.23	69.0	E		
T	4330	6765	0.18	0.64	5.9	A	27.4	C

Intersection Delay = 34.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Redhill Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	412	0	332					1088	537	383	738	
% Heavy Veh	2	2	2					2	2	2	2	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
PK 15 Vol	108	0	87					286	141	101	194	
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat		1900	1900					1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
LGConfig		LT	R					T	R	L	T	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			
Adj Flow		434	349					1145	565	403	777	
%InSharedLn												
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	
Peds Bikes		0			0			0				
Buses		0	0					0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0					0.0	0.0	0.0	0.0	
Arriv. Type		3	3					3	3	3	3	
Unit Ext.		3.0	3.0					3.0	3.0	3.0	3.0	
I Factor		1.000						1.000			1.000	
Lost Time		2.0	2.0					2.0	2.0	2.0	2.0	
Ext of g		2.0	2.0					2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.0	0.0				18.6	10.9	13.9	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	412	0	332					1088	537	383	738	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
Adj flow	434	0	349					1145	565	403	777	
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
Lane group		LT	R					T	R	L	T	
Adj flow		434	349					1145	565	403	777	
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound			Southbound	
LG	LT	R					T	R	L	T	
So	1900	1900					1900	1900	1900	1900	
Lanes	0 1	0 1	0	0	0	0	4	1	1	4	0
fW	1.000	1.000					1.000	1.000	1.000	1.000	
fHV	0.980	0.980					0.980	0.980	0.980	0.980	
fG	1.000	1.000					1.000	1.000	1.000	1.000	
fP	1.000	1.000					1.000	1.000	1.000	1.000	
fBB	1.000	1.000					1.000	1.000	1.000	1.000	
fA	1.000	1.000					1.000	1.000	1.000	1.000	
fLU	1.000	1.000					0.908	1.000	1.000	0.908	
fRT	1.000	0.850					1.000	0.850		1.000	
fLT	0.952						1.000		0.950	1.000	
Sec.											
fLpb	1.000						1.000		1.000	1.000	
fRpb	1.000	1.000					1.000	1.000		1.000	
S	1774	1583					6765	1583	1770	6765	
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	434	1774	#	0.24	0.26	466	0.93
Right	R	349	1583		0.22	0.26	416	0.84
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1145	6765		0.17	0.36	2444	0.47
Right	R	565	1583	#	0.36	0.36	572	0.99
Southbound								
Prot								
Perm								
Left	L	403	1770	#	0.23	0.23	412	0.98
Prot								
Perm								
Thru	T	777	6765		0.11	0.64	4330	0.18
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.83
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.97

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
LT	0.93	0.26	28.8	1.000	466	0.45	25.6	0.0	54.4	D	48.9	D
R	0.84	0.26	27.9	1.000	416	0.37	14.1	0.0	42.0	D		
Westbound												
Northbound												
T	0.47	0.36	19.6	1.000	2444	0.11	0.1	0.0	19.8	B	33.0	C
R	0.99	0.36	25.4	1.000	572	0.49	34.4	0.0	59.8	E		
Southbound												
L	0.98	0.23	30.5	1.000	412	0.48	38.5	0.0	69.0	E		

T	0.18	0.64	5.9	1.000	4330	0.11	0.0	0.0	5.9	A	27.4	C

Intersection delay = 34.6 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	1.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

LT	0.0	0.00	29.5	28.8	0.00	0.0	0.0	54.4
R	0.0	0.00	29.5	27.9	0.00	0.0	0.0	42.0
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	25.6	19.6	0.00	0.0	0.0	19.8
R	0.0	0.00	25.6	25.4	0.00	0.0	0.0	59.8
Southbound								
L	0.0	0.00	30.7	30.5	0.00	0.0	0.0	69.0
T	0.0	0.00	14.4	5.9	0.00	0.0	0.0	5.9
	0.0						0.0	

Intersection Delay 34.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	LT	R					T	R		L	T	
Init Queue	0.0	0.0					0.0	0.0		0.0	0.0	
Flow Rate	434	349					315	565		403	213	
So	1900	1900					1900	1900		1900	1900	
No.Lanes	0 1	1		0	0	0	0 4	1		1	4	0
SL	1774	1583					1862	1583		1770	1862	
LnCapacity	466	416					672	572		412	1192	
Flow Ratio	0.2	0.2					0.2	0.4		0.2	0.1	
v/c Ratio	0.93	0.84					0.47	0.99		0.98	0.18	
Grn Ratio	0.26	0.26					0.36	0.36		0.23	0.64	
I Factor	1.000						1.000				1.000	
AT or PVG	3	3					3	3		3	3	
Pltn Ratio	1.00	1.00					1.00	1.00		1.00	1.00	
PF2	1.00	1.00					1.00	1.00		1.00	1.00	
Q1	9.4	7.3					5.4	12.5		8.9	1.9	
kB	0.4	0.4					0.5	0.5		0.4	0.7	
Q2	3.1	1.7					0.4	5.3		3.8	0.2	
Q Average	12.5	9.0					5.8	17.7		12.7	2.1	
Q Spacing	25.0	25.0					25.0	25.0		25.0	25.0	
Q Storage	0	0					0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2					1.2	1.2		1.2	1.2	
BOQ	14.7	10.6					6.9	20.7		14.9	2.5	
QSRatio												
85th Percentile Output:												
fB%	1.5	1.5					1.5	1.5		1.5	1.6	
BOQ	18.7	13.7					9.0	26.0		19.0	3.3	
QSRatio												
90th Percentile Output:												
fB%	1.6	1.7					1.7	1.6		1.6	1.8	
BOQ	20.2	14.9					9.9	27.8		20.5	3.7	
QSRatio												
95th Percentile Output:												
fB%	1.8	1.9					1.9	1.7		1.8	2.0	
BOQ	22.5	16.8					11.3	30.6		22.9	4.2	
QSRatio												
98th Percentile Output:												
fB%	2.1	2.2					2.3	2.0		2.1	2.6	
BOQ	26.1	19.8					13.6	34.7		26.4	5.3	
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Newport Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Volume	277	62	439	77		163		1100	87	171	1774	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right	A	A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right	A	A	A
SB Right					WB Right			
Green	7.6	11.7	0.0			7.7	8.4	6.4	0.0
Yellow	3.6	3.6				3.2	3.9	3.9	
All Red	1.0	1.0				1.0	1.0	1.0	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	319	1770	0.92	0.18	55.9	E		
LT	335	1863	0.19	0.18	22.9	C	21.8	C
R	1583	1583	0.29	1.00	0.1	A		
Westbound								
L	207	1770	0.39	0.12	27.8	C		
							59.8	E
R	185	1583	0.93	0.12	74.9	E		
Northbound								
TR	1521	5018	0.82	0.30	24.8	C	24.8	C
Southbound								
L	210	1770	0.86	0.12	56.0	E		
T	2467	5074	0.76	0.49	15.0	B	18.6	B

Intersection Delay = 23.3 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Newport Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Newport Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	277	62	439	77		163		1100	87	171	1774	
% Heavy Veh	2	2	2	2		2		2	2	2	2	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol	73	16	116	20		43		289	23	45	467	
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900	1900	1900		1900		1900		1900	1900	
ParkExist												
NumPark												
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol		0				0			0			
Adj Flow	292	65	462	81		172		1250		180	1867	
%InSharedLn	0											
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.074			0.000	
Peds Bikes	0				0			0				
Buses	0	0	0	0		0		0		0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Arriv. Type	3	3	3	3		3		3		3	3	
Unit Ext.	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right	A	A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right	A	A	A
SB Right					WB Right			
Green	7.6	11.7	0.0		7.7	8.4	6.4	0.0
Yellow	3.6	3.6			3.2	3.9	3.9	
All Red	1.0	1.0			1.0	1.0	1.0	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	277	62	439	77		163		1100	87	171	1774	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow	292	65	462	81		172		1158	92	180	1867	
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
Lane group	L	LT	R	L		R		TR		L	T	
Adj flow	292	65	462	81		172		1250		180	1867	
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.074			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LT	R	L		R	TR			L	T	
So	1900	1900	1900	1900		1900	1900			1900	1900	
Lanes	1	1	1	1	0	1	0	3	0	1	3	0
fW	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fHV	0.980	0.980	0.980	0.980		0.980		0.980		0.980	0.980	
fG	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fP	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fBB	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fA	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fLU	1.000	1.000	1.000	1.000		1.000		0.908		1.000	0.908	
fRT		1.000	0.850			0.850		0.989			1.000	
fLT	0.950	1.000		0.950				1.000		0.950	1.000	
Sec.												
fLpb	1.000	1.000		1.000				1.000		1.000	1.000	
fRpb		1.000	1.000			1.000		1.000			1.000	
S	1770	1863	1583	1770		1583		5018		1770	5074	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	292	1770	#	0.16	0.18	319	0.92
Prot								
Perm								
Thru	LT	65	1863		0.03	0.18	335	0.19
Right	R	462	1583		0.29	1.00	1583	0.29
Westbound								
Prot								
Perm								
Left	L	81	1770		0.05	0.12	207	0.39
Prot								
Perm								
Thru								
Right	R	172	1583	#	0.11	0.12	185	0.93
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1250	5018		0.25	0.30	1521	0.82
Right								
Southbound								
Prot								
Perm								
Left	L	180	1770		0.10	0.12	210	0.86
Prot								
Perm								
Thru	T	1867	5074	#	0.37	0.49	2467	0.76
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.64
Total lost time per cycle, L = 14.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.82

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.92	0.18	26.2	1.000	319	0.43	29.7	0.0	55.9	E		
LT	0.19	0.18	22.6	1.000	335	0.11	0.3	0.0	22.9	C	21.8	C
R	0.29	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Westbound												
L	0.39	0.12	26.6	1.000	207	0.11	1.2	0.0	27.8	C		
											59.8	E
R	0.93	0.12	28.4	1.000	185	0.45	46.4	0.0	74.9	E		
Northbound												
TR	0.82	0.30	21.0	1.000	1521	0.36	3.8	0.0	24.8	C	24.8	C
Southbound												
L	0.86	0.12	28.1	1.000	210	0.39	27.9	0.0	56.0	E		

T	0.76	0.49	13.6	1.000	2467	0.31	1.4	0.0	15.0	B	18.6	B

Intersection delay = 23.3 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	26.7	26.2	0.00	0.0	0.0	55.9

LT	0.0	0.00	26.7	22.6	0.00	0.0	0.0	22.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Westbound								
L	0.0	0.00	28.7	26.6	0.00	0.0	0.0	27.8
	0.0						0.0	
R	0.0	0.00	28.7	28.4	0.00	0.0	0.0	74.9
Northbound								
	0.0						0.0	
TR	0.0	0.00	22.7	21.0	0.00	0.0	0.0	24.8
	0.0						0.0	
Southbound								
L	0.0	0.00	28.7	28.1	0.00	0.0	0.0	56.0
T	0.0	0.00	16.7	13.6	0.00	0.0	0.0	15.0
	0.0						0.0	

Intersection Delay 23.3 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound	Southbound	
LaneGroup	L	LT	R	L	R	TR	L	T
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate	292	65	462	81	172	458	180	685
So	1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	1	1	1	1 0	1	0 3 0	1	3 0
SL	1770	1863	1583	1770	1583	1842	1770	1862
LnCapacity	319	335	1583	207	185	558	210	905
Flow Ratio	0.2	0.0	0.3	0.0	0.1	0.2	0.1	0.4
v/c Ratio	0.92	0.19	0.29	0.39	0.93	0.82	0.86	0.76
Grn Ratio	0.18	0.18	1.00	0.12	0.12	0.30	0.12	0.49
I Factor		1.000		1.000		1.000		1.000
AT or PVG	3	3	3	3	3	3	3	3
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1	5.2	1.0		1.4	3.1	7.7	3.2	10.1
kB	0.3	0.3	0.7	0.2	0.2	0.4	0.2	0.5
Q2	2.0	0.1	0.3	0.1	1.4	1.6	1.0	1.6
Q Average	7.1	1.1		1.5	4.5	9.3	4.2	11.6
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage	0	0	0	0	0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2		1.2	1.2	1.2	1.2	1.2
BOQ	8.4	1.3		1.8	5.4	11.0	5.0	13.7
QSRatio								
85th Percentile Output:								
fB%	1.5	1.6		1.6	1.6	1.5	1.6	1.5
BOQ	11.0	1.7		2.4	7.0	14.1	6.6	17.5
QSRatio								
90th Percentile Output:								
fB%	1.7	1.8		1.8	1.7	1.7	1.7	1.6
BOQ	12.0	1.9		2.6	7.8	15.3	7.3	18.9
QSRatio								
95th Percentile Output:								
fB%	1.9	2.1		2.1	2.0	1.9	2.0	1.8
BOQ	13.6	2.2		3.1	8.9	17.3	8.4	21.1
QSRatio								
98th Percentile Output:								
fB%	2.3	2.6		2.6	2.4	2.2	2.4	2.1
BOQ	16.2	2.8		3.9	10.9	20.3	10.3	24.5
QSRatio								

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-5 SB Ramps

Inter.: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Newport Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Volume	368	50	583	78		172		1845	100	253	1143	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right	A	A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right	A	A	A
SB Right					WB Right			
Green	12.5	17.7	0.0			12.9	21.8	16.9	0.0
Yellow	3.6	3.6				3.2	3.9	3.9	
All Red	1.0	1.0				1.0	1.0	1.0	

Cycle Length: 105.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
L	298	1770	1.30	0.17	200.5	F		
LT	314	1863	0.17	0.17	37.6	D	75.6	E
R	1583	1583	0.39	1.00	0.2	A		
Westbound								
L	211	1770	0.39	0.12	43.9	D		
							83.0	F
R	188	1583	0.96	0.12	100.7	F		
Northbound								
TR	2091	5035	0.98	0.42	45.2	D	45.2	D
Southbound								
L	217	1770	1.23	0.12	181.5	F		
T	2933	5074	0.41	0.58	12.3	B	43.0	D

Intersection Delay = 53.2 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Newport Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-5 SB Ramps N/S St: Newport Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	368	50	583	78		172		1845	100	253	1143	
% Heavy Veh	2	2	2	2		2		2	2	2	2	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol	97	13	153	21		45		486	26	67	301	
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900	1900	1900		1900		1900		1900	1900	
ParkExist												
NumPark												
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol		0				0			0			
Adj Flow	387	53	614	82		181		2047		266	1203	
%InSharedLn	0											
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.051			0.000	
Peds Bikes	0				0			0				
Buses	0	0	0	0		0		0		0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Arriv. Type	3	3	3	3		3		3		3	3	
Unit Ext.	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right	A	A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right	A	A	A
SB Right					WB Right			
Green	12.5	17.7	0.0			12.9	21.8	16.9	0.0
Yellow	3.6	3.6				3.2	3.9	3.9	
All Red	1.0	1.0				1.0	1.0	1.0	

Cycle Length: 105.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	368	50	583	78		172		1845	100	253	1143	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow	387	53	614	82		181		1942	105	266	1203	
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
Lane group	L	LT	R	L		R		TR		L	T	
Adj flow	387	53	614	82		181		2047		266	1203	
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.051			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LT	R	L		R	TR			L	T	
So	1900	1900	1900	1900		1900	1900			1900	1900	
Lanes	1	1	1	1	0	1	0	3	0	1	3	0
fW	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fHV	0.980	0.980	0.980	0.980		0.980		0.980		0.980	0.980	
fG	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fP	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fBB	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fA	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fLU	1.000	1.000	1.000	1.000		1.000		0.908		1.000	0.908	
fRT		1.000	0.850			0.850		0.992			1.000	
fLT	0.950	1.000		0.950				1.000		0.950	1.000	
Sec.												
fLpb	1.000	1.000		1.000				1.000		1.000	1.000	
fRpb		1.000	1.000			1.000		1.000			1.000	
S	1770	1863	1583	1770		1583		5035		1770	5074	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	387	1770	#	0.22	0.17	298	1.30
Prot								
Perm								
Thru	LT	53	1863		0.03	0.17	314	0.17
Right	R	614	1583		0.39	1.00	1583	0.39
Westbound								
Prot								
Perm								
Left	L	82	1770		0.05	0.12	211	0.39
Prot								
Perm								
Thru								
Right	R	181	1583	#	0.11	0.12	188	0.96
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	2047	5035	#	0.41	0.42	2091	0.98
Right								
Southbound								
Prot								
Perm								
Left	L	266	1770	#	0.15	0.12	217	1.23
Prot								
Perm								
Thru	T	1203	5074		0.24	0.58	2933	0.41
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.89
Total lost time per cycle, L = 18.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.08

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.30	0.17	43.7	1.000	298	0.50	156.9	0.0	200.5	F		
LT	0.17	0.17	37.4	1.000	314	0.11	0.3	0.0	37.6	D	75.6	E
R	0.39	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Westbound												
L	0.39	0.12	42.7	1.000	211	0.11	1.2	0.0	43.9	D		
											83.0	F
R	0.96	0.12	46.0	1.000	188	0.47	54.7	0.0	100.7	F		
Northbound												
TR	0.98	0.42	30.2	1.000	2091	0.48	15.0	0.0	45.2	D	45.2	D
Southbound												
L	1.23	0.12	46.1	1.000	217	0.50	135.4	0.0	181.5	F		

T	0.41	0.58	12.2	1.000	2933	0.11	0.1	0.0	12.3	B	43.0	D

Intersection delay = 53.2 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 105.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 105.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	105.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

L	0.0	0.00	43.7	43.7	0.00	22.3	0.0	200.5
LT	0.0	0.00	43.7	37.4	0.00	0.0	0.0	37.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
L	0.0	0.00	46.3	42.7	0.00	0.0	0.0	43.9
	0.0						0.0	
R	0.0	0.00	46.3	46.0	0.00	0.0	0.0	100.7
Northbound								
	0.0						0.0	
TR	0.0	0.00	30.7	30.2	0.00	0.0	0.0	45.2
	0.0						0.0	
Southbound								
L	0.0	0.00	46.1	46.1	0.00	12.3	0.0	181.5
T	0.0	0.00	22.2	12.2	0.00	0.0	0.0	12.3
	0.0						0.0	

Intersection Delay 53.2 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound	Southbound	
LaneGroup	L	LT	R	L	R	TR	L	T
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate	387	53	614	82	181	751	266	441
So	1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	1	1	1	1 0	1	0 3 0	1	3 0
SL	1770	1863	1583	1770	1583	1848	1770	1862
LnCapacity	298	314	1583	211	188	767	217	1076
Flow Ratio	0.2	0.0	0.4	0.0	0.1	0.4	0.2	0.2
v/c Ratio	1.30	0.17	0.39	0.39	0.96	0.98	1.23	0.41
Grn Ratio	0.17	0.17	1.00	0.12	0.12	0.42	0.12	0.58
I Factor		1.000		1.000		1.000		1.000
AT or PVG	3	3	3	3	3	3	3	3
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1	11.3	1.3		2.2	5.3	21.6	7.8	7.1
kB	0.4	0.4	1.0	0.3	0.3	0.6	0.3	0.8
Q2	12.5	0.1	0.6	0.2	2.1	6.8	7.5	0.5
Q Average	23.8	1.4		2.4	7.4	28.4	15.2	7.7
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage	0	0	0	0	0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2		1.2	1.2	1.1	1.2	1.2
BOQ	27.5	1.7		2.9	8.7	32.7	17.8	9.1
QSRatio								
85th Percentile Output:								
fB%	1.4	1.6		1.6	1.5	1.4	1.5	1.5
BOQ	34.2	2.2		3.8	11.3	40.3	22.6	11.7
QSRatio								
90th Percentile Output:								
fB%	1.5	1.8		1.8	1.7	1.5	1.6	1.7
BOQ	36.3	2.5		4.2	12.3	42.6	24.2	12.8
QSRatio								
95th Percentile Output:								
fB%	1.7	2.1		2.0	1.9	1.6	1.8	1.9
BOQ	39.5	2.9		4.9	14.0	46.2	26.8	14.5
QSRatio								
98th Percentile Output:								
fB%	1.9	2.6		2.5	2.3	1.8	2.0	2.3
BOQ	44.3	3.6		6.1	16.7	51.5	30.6	17.3
QSRatio								

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 NB Ramps

Inter.: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Volume				850		521		849	560		1340	930
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right	A	A		
Peds					Peds				
NB Right		A			EB Right				
SB Right		A			WB Right				
Green		23.5	0.0			4.5	10.3	0.0	
Yellow		4.3				4.3	3.6		
All Red		3.5				3.5	2.5		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1346	3437	0.66	0.39	16.3	B		
							21.9	C
R	620	1583	0.88	0.39	31.2	C		
Northbound								
T	1911	5074	0.47	0.38	14.3	B	8.7	A
R	1583	1583	0.37	1.00	0.1	A		
Southbound								
T	1911	5074	0.74	0.38	17.7	B	10.8	B
R	1583	1583	0.62	1.00	0.7	A		

Intersection Delay = 13.2 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 NB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				850		521		849	560		1340	930
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				224		137		223	147		353	245
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				895		548		894	589		1411	979
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		23.5	0.0			4.5	10.3	0.0
Yellow		4.3				4.3	3.6	
All Red		3.5				3.5	2.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				850		521		849	560		1340	930
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				895		548		894	589		1411	979
No. Lanes	0	0	0		2	0 1		0 3	1		0 3	1
Lane group				L		R		T	R		T	R
Adj flow				895		548		894	589		1411	979
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		T		R
So				1900		1900	1900	1900		1900		1900
Lanes	0	0	0	2	0	1	0 3	1	0	3		1
fW				1.000		1.000	1.000	1.000		1.000		1.000
fHV				0.980		0.980	0.980	0.980		0.980		0.980
fG				1.000		1.000	1.000	1.000		1.000		1.000
fP				1.000		1.000	1.000	1.000		1.000		1.000
fBB				1.000		1.000	1.000	1.000		1.000		1.000
fA				1.000		1.000	1.000	1.000		1.000		1.000
fLU				0.971		1.000	0.908	1.000		0.908		1.000
fRT						0.850	1.000	0.850		1.000		0.850
fLT				0.950			1.000			1.000		
Sec.												
fLpb				1.000			1.000			1.000		
fRpb						1.000	1.000	1.000		1.000		1.000
S				3437		1583	5074	1583		5074		1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	895	3437		0.26	0.39	1346	0.66
Prot								
Perm								
Thru								
Right	R	548	1583	#	0.35	0.39	620	0.88
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	894	5074		0.18	0.38	1911	0.47
Right	R	589	1583		0.37	1.00	1583	0.37
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1411	5074	#	0.28	0.38	1911	0.74
Right	R	979	1583		0.62	1.00	1583	0.62

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.62
Total lost time per cycle, L = 13.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.81

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.66	0.39	15.0	1.000	1346	0.24	1.3	0.0	16.3	B		
											21.9	C
R	0.88	0.39	17.0	1.000	620	0.41	14.2	0.0	31.2	C		
Northbound												
T	0.47	0.38	14.1	1.000	1911	0.11	0.2	0.0	14.3	B	8.7	A
R	0.37	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.74	0.38	16.1	1.000	1911	0.30	1.6	0.0	17.7	B	10.8	B
R	0.62	1.00	0.0	0.950	1583	0.20	0.7	0.0	0.7	A		

Intersection delay = 13.2 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	18.2	15.0	0.00	0.0	0.0	16.3
	0.0						0.0	
R	0.0	0.00	18.2	17.0	0.00	0.0	0.0	31.2
Northbound								
	0.0						0.0	
T	0.0	0.00	18.7	14.1	0.00	0.0	0.0	14.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	18.7	16.1	0.00	0.0	0.0	17.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.7

Intersection Delay 13.2 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				460	548	328	589	517	979
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	0 1	0 3	1	0 3	1
SL				1770	1583	1862	1583	1862	1583
LnCapacity				693	620	701	1583	701	1583
Flow Ratio				0.3	0.3	0.2	0.4	0.3	0.6
v/c Ratio				0.66	0.88	0.47	0.37	0.74	0.62
Grn Ratio				0.39	0.39	0.38	1.00	0.38	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00		1.00	
Q1				6.3	8.5	4.1		7.4	
kB				0.4	0.4	0.4	0.7	0.4	0.7
Q2				0.8	2.4	0.4	0.4	1.2	1.1
Q Average				7.1	10.9	4.5		8.6	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2	1.2	1.2		1.2	
BOQ				8.4	12.9	5.4		10.2	
QSRatio									
85th Percentile Output:									
fB%				1.5	1.5	1.6		1.5	
BOQ				11.0	16.5	7.0		13.1	
QSRatio									
90th Percentile Output:									
fB%				1.7	1.6	1.7		1.7	
BOQ				12.0	17.8	7.8		14.3	
QSRatio									
95th Percentile Output:									
fB%				1.9	1.8	2.0		1.9	
BOQ				13.6	20.0	8.9		16.1	
QSRatio									
98th Percentile Output:									
fB%				2.3	2.1	2.4		2.2	
BOQ				16.3	23.3	10.9		19.1	
QSRatio									

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 NB Ramps

Inter.: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Volume				469		805		2175	400		1291	690
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left	A				SB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	50.1	0.0				32.7	15.5	0.0	
Yellow	4.3					4.3	3.6		
All Red	3.5					3.5	2.5		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1435	3437	0.34	0.42	23.9	C		
							118.1	F
R	661	1583	1.28	0.42	173.0	F		
Northbound								
T	2368	5074	0.97	0.47	42.8	D	36.2	D
R	1583	1583	0.27	1.00	0.1	A		
Southbound								
T	2368	5074	0.57	0.47	23.7	C	15.5	B
R	1583	1583	0.46	1.00	0.2	A		

Intersection Delay = 47.0 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Culver at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 NB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				469	805			2175	400		1291	690
% Heavy Veh				2	2			2	2		2	2
PHF				0.95	0.95			0.95	0.95		0.95	0.95
PK 15 Vol				123	212			572	105		340	182
Hi Ln Vol												
% Grade				0				0			0	
Ideal Sat				1900	1900			1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				494		847		2289	421		1359	726
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		50.1	0.0			32.7	15.5	0.0
Yellow		4.3				4.3	3.6	
All Red		3.5				3.5	2.5	

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				469	805			2175	400		1291	690
PHF				0.95	0.95			0.95	0.95		0.95	0.95
Adj flow				494	847			2289	421		1359	726
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
Lane group				L		R		T	R		T	R
Adj flow				494		847		2289	421		1359	726
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		T		R
So				1900		1900	1900	1900		1900		1900
Lanes	0	0	0	2	0	1	0 3	1	0	3		1
fW				1.000		1.000	1.000	1.000		1.000		1.000
fHV				0.980		0.980	0.980	0.980		0.980		0.980
fG				1.000		1.000	1.000	1.000		1.000		1.000
fP				1.000		1.000	1.000	1.000		1.000		1.000
fBB				1.000		1.000	1.000	1.000		1.000		1.000
fA				1.000		1.000	1.000	1.000		1.000		1.000
fLU				0.971		1.000	0.908	1.000		0.908		1.000
fRT						0.850	1.000	0.850		1.000		0.850
fLT				0.950			1.000			1.000		
Sec.												
fLpb				1.000			1.000			1.000		
fRpb						1.000	1.000	1.000		1.000		1.000
S				3437		1583	5074	1583		5074		1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	494	3437		0.14	0.42	1435	0.34
Prot								
Perm								
Thru								
Right	R	847	1583	#	0.54	0.42	661	1.28
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2289	5074	#	0.45	0.47	2368	0.97
Right	R	421	1583		0.27	1.00	1583	0.27
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1359	5074		0.27	0.47	2368	0.57
Right	R	726	1583		0.46	1.00	1583	0.46

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.99
Total lost time per cycle, L = 13.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.12

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.34	0.42	23.8	1.000	1435	0.11	0.1	0.0	23.9	C		
											118.1	F
R	1.28	0.42	35.0	1.000	661	0.50	138.0	0.0	173.0	F		
Northbound												
T	0.97	0.47	31.1	1.000	2368	0.47	11.7	0.0	42.8	D	36.2	D
R	0.27	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.57	0.47	23.3	1.000	2368	0.17	0.3	0.0	23.7	C	15.5	B
R	0.46	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 47.0 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	120.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	35.0	23.8	0.00	0.0	0.0	23.9
	0.0						0.0	
R	0.0	0.00	35.0	35.0	0.00	46.5	0.0	173.0
Northbound								
	0.0						0.0	
T	0.0	0.00	32.0	31.1	0.00	0.0	0.0	42.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	32.0	23.3	0.00	0.0	0.0	23.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 47.0 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				254	847	840	421	498	726
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2 0	1	0 3	1	0 3	1
SL				1770	1583	1862	1583	1862	1583
LnCapacity				738	661	869	1583	869	1583
Flow Ratio				0.1	0.5	0.5	0.3	0.3	0.5
v/c Ratio				0.34	1.28	0.97	0.27	0.57	0.46
Grn Ratio				0.42	0.42	0.47	1.00	0.47	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00		1.00	
Q1				5.8	28.2	27.2		12.1	
kB				0.7	0.6	0.8	1.1	0.8	1.1
Q2				0.4	25.9	7.3	0.4	1.0	0.9
Q Average				6.1	54.1	34.5		13.1	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2	1.1	1.1		1.2	
BOQ				7.3	60.9	39.4		15.3	
QSRatio									
85th Percentile Output:									
fB%				1.5	1.3	1.4		1.5	
BOQ				9.4	73.0	48.1		19.5	
QSRatio									
90th Percentile Output:									
fB%				1.7	1.4	1.5		1.6	
BOQ				10.4	77.2	50.7		21.0	
QSRatio									
95th Percentile Output:									
fB%				1.9	1.5	1.6		1.8	
BOQ				11.8	82.8	54.8		23.4	
QSRatio									
98th Percentile Output:									
fB%				2.3	1.7	1.8		2.1	
BOQ				14.2	92.8	61.0		27.0	
QSRatio									

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 SB Ramps

Inter.: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	307	0	523					1073	270		1887	250
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	26.3	0.0				6.1	22.9	0.0	
Yellow	3.6					4.3	4.3		
All Red	2.5					2.5	2.5		

Cycle Length: 75.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	621	1770	0.52	0.35	20.1	C		
LTR	653	1863	0.00	0.35	15.8	B	45.6	D
R	555	1583	0.99	0.35	60.5	E		
Westbound								
Northbound								
T	2422	5074	0.47	0.48	13.3	B	10.7	B
R	1583	1583	0.18	1.00	0.1	A		
Southbound								
T	2422	5074	0.82	0.48	19.2	B	17.0	B
R	1583	1583	0.17	1.00	0.0+	A		

Intersection Delay = 20.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Culver at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	307	0	523					1073	270		1887	250
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	81	0	138					282	71		497	66
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	323	0	551					1129	284		1986	263
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		26.3	0.0			6.1	22.9	0.0
Yellow		3.6				4.3	4.3	
All Red		2.5				2.5	2.5	

Cycle Length: 75.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	307	0	523					1073	270		1887	250
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	323	0	551					1129	284		1986	263
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	323	0	551					1129	284		1986	263
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound				Northbound			Southbound	
LG	L	LTR	R					T	R		T	R
So	1900	1900	1900					1900	1900		1900	1900
Lanes	1	1	1	0	0	0	0	3	1	0	3	1
fW	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980					0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fLU	1.000	1.000	1.000					0.908	1.000		0.908	1.000
fRT		1.000	0.850					1.000	0.850		1.000	0.850
fLT	0.950	1.000						1.000			1.000	
Sec.												
fLpb	1.000	1.000						1.000			1.000	
fRpb		1.000	1.000					1.000	1.000		1.000	1.000
S	1770	1863	1583					5074	1583		5074	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	323	1770		0.18	0.35	621	0.52
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.35	653	0.00
Right	R	551	1583	#	0.35	0.35	555	0.99
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1129	5074		0.22	0.48	2422	0.47
Right	R	284	1583		0.18	1.00	1583	0.18
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1986	5074	#	0.39	0.48	2422	0.82
Right	R	263	1583		0.17	1.00	1583	0.17

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.74
Total lost time per cycle, L = 12.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.89

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.52	0.35	19.3	1.000	621	0.13	0.8	0.0	20.1	C		
LTR	0.00	0.35	15.8	1.000	653	0.11	0.0	0.0	15.8	B	45.6	D
R	0.99	0.35	24.3	1.000	555	0.49	36.3	0.0	60.5	E		
Westbound												
Northbound												
T	0.47	0.48	13.2	1.000	2422	0.11	0.1	0.0	13.3	B	10.7	B
R	0.18	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.82	0.48	16.8	1.000	2422	0.36	2.4	0.0	19.2	B	17.0 B
R	0.17	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A	

Intersection delay = 20.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	75.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	24.4	19.3	0.00	0.0	0.0	20.1

LTR	0.0	0.00	24.4	15.8	0.00	0.0	0.0	15.8
R	0.0	0.00	24.4	24.3	0.00	0.0	0.0	60.5
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	19.6	13.2	0.00	0.0	0.0	13.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	19.6	16.8	0.00	0.0	0.0	19.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+

Intersection Delay 20.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup	L	LTR	R				T	R	T	R
Init Queue	0.0	0.0	0.0				0.0	0.0	0.0	0.0
Flow Rate	323	0	551				414	284	729	263
So	1900	1900	1900				1900	1900	1900	1900
No.Lanes	1	1	1	0	0	0	3	1	3	1
SL	1770	1863	1583				1862	1583	1862	1583
LnCapacity	621	653	555				889	1583	889	1583
Flow Ratio	0.2	0.0	0.3				0.2	0.2	0.4	0.2
v/c Ratio	0.52	0.00	0.99				0.47	0.18	0.82	0.17
Grn Ratio	0.35	0.35	0.35				0.48	1.00	0.48	1.00
I Factor		1.000					1.000		1.000	
AT or PVG	3	3	3				3	3	3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00				1.00		1.00	
Q1	5.3	0.0	11.4				5.8		13.0	
kB	0.5	0.5	0.4				0.6	0.8	0.6	0.8
Q2	0.5	0.0	5.2				0.5	0.2	2.3	0.2
Q Average	5.8	0.0	16.7				6.3		15.4	
Q Spacing	25.0	25.0	25.0				25.0	25.0	25.0	25.0
Q Storage	0	0	0				0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2	1.2				1.2		1.2	
BOQ	6.9	0.0	19.4				7.5		18.0	
QSRatio										
85th Percentile Output:										
fB%	1.5	1.6	1.5				1.5		1.5	
BOQ	9.0	0.0	24.5				9.7		22.8	
QSRatio										
90th Percentile Output:										
fB%	1.7	1.8	1.6				1.7		1.6	
BOQ	9.9	0.0	26.2				10.7		24.4	
QSRatio										
95th Percentile Output:										
fB%	1.9	2.1	1.7				1.9		1.8	
BOQ	11.3	0.0	29.0				12.1		27.0	
QSRatio										
98th Percentile Output:										
fB%	2.3	2.7	2.0				2.3		2.0	
BOQ	13.7	0.0	32.9				14.6		30.9	
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 SB Ramps

Inter.: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	967	0	497					1643	730		1313	340
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	37.7	0.0				13.0	4.6	0.0	
Yellow	3.6					4.3	4.3		
All Red	2.5					2.5	2.5		

Cycle Length: 75.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	890	1770	1.14	0.50	96.7	F		
LTR	936	1863	0.00	0.50	9.3	A	69.3	E
R	796	1583	0.66	0.50	15.8	B		
Westbound								
Northbound								
T	1651	5074	1.05	0.33	61.0	E	42.3	D
R	1583	1583	0.49	1.00	0.2	A		
Southbound								
T	1651	5074	0.84	0.33	27.4	C	21.8	C
R	1583	1583	0.23	1.00	0.1	A		

Intersection Delay = 43.3 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Culver at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	967	0	497					1643	730		1313	340
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	254	0	131					432	192		346	89
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	1018	0	523					1729	768		1382	358
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	37.7	0.0			13.0	4.6	0.0	
Yellow	3.6				4.3	4.3		
All Red	2.5				2.5	2.5		

Cycle Length: 75.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	967	0	497					1643	730		1313	340
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	1018	0	523					1729	768		1382	358
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	1018	0	523					1729	768		1382	358
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound				Northbound			Southbound	
LG	L	LTR	R					T	R		T	R
So	1900	1900	1900					1900	1900		1900	1900
Lanes	1	1	1	0	0	0	0	3	1	0	3	1
fW	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980					0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000					1.000	1.000		1.000	1.000
fLU	1.000	1.000	1.000					0.908	1.000		0.908	1.000
fRT		1.000	0.850					1.000	0.850		1.000	0.850
fLT	0.950	1.000						1.000			1.000	
Sec.												
fLpb	1.000	1.000						1.000			1.000	
fRpb		1.000	1.000					1.000	1.000		1.000	1.000
S	1770	1863	1583					5074	1583		5074	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	1018	1770	#	0.58	0.50	890	1.14
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.50	936	0.00
Right	R	523	1583		0.33	0.50	796	0.66
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1729	5074	#	0.34	0.33	1651	1.05
Right	R	768	1583		0.49	1.00	1583	0.49
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1382	5074		0.27	0.33	1651	0.84
Right	R	358	1583		0.23	1.00	1583	0.23

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.92
Total lost time per cycle, L = 12.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.11

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.14	0.50	18.6	1.000	890	0.50	78.1	0.0	96.7	F		
LTR	0.00	0.50	9.3	1.000	936	0.11	0.0	0.0	9.3	A	69.3	E
R	0.66	0.50	13.8	1.000	796	0.23	2.0	0.0	15.8	B		
Westbound												
Northbound												
T	1.05	0.33	25.3	1.000	1651	0.50	35.7	0.0	61.0	E	42.3	D
R	0.49	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.84	0.33	23.5	1.000	1651	0.37	4.0	0.0	27.4	C	21.8	C
R	0.23	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 43.3 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	75.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	75.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	75.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	18.6	18.6	0.00	32.0	0.0	96.7

LTR	0.0	0.00	18.6	9.3	0.00	0.0	0.0	9.3
R	0.0	0.00	18.6	13.8	0.00	0.0	0.0	15.8
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	25.3	25.3	0.00	19.5	0.0	61.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	25.3	23.5	0.00	0.0	0.0	27.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 43.3 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	1018	0	523				634	768		507	358	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	3	1	0	3	1	
SL	1770	1863	1583				1862	1583		1862	1583	
LnCapacity	890	936	796				606	1583		606	1583	
Flow Ratio	0.6	0.0	0.3				0.3	0.5		0.3	0.2	
v/c Ratio	1.14	0.00	0.66				1.05	0.49		0.84	0.23	
Grn Ratio	0.50	0.50	0.50				0.33	1.00		0.33	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	21.2	0.0	8.1				13.2			9.8		
kB	0.6	0.6	0.5				0.5	0.8		0.5	0.8	
Q2	19.7	0.0	1.0				8.0	0.8		2.0	0.2	
Q Average	40.9	0.0	9.1				21.2			11.8		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.2				1.2			1.2		
BOQ	46.5	0.0	10.7				24.6			13.9		
QSRatio												
85th Percentile Output:												
fB%	1.4	1.6	1.5				1.4			1.5		
BOQ	56.3	0.0	13.8				30.7			17.7		
QSRatio												
90th Percentile Output:												
fB%	1.5	1.8	1.7				1.5			1.6		
BOQ	59.4	0.0	15.0				32.7			19.1		
QSRatio												
95th Percentile Output:												
fB%	1.6	2.1	1.9				1.7			1.8		
BOQ	63.9	0.0	16.9				35.8			21.4		
QSRatio												
98th Percentile Output:												
fB%	1.7	2.7	2.2				1.9			2.1		
BOQ	71.3	0.0	20.0				40.2			24.8		
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 NB Ramps

Inter.: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Volume				1397		1003		1987	620		2023	1800
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right	A	A	
Green	20.0	0.0				14.3	7.7	0.0
Yellow	3.6					4.7	4.7	
All Red	2.0					1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1607	4820	0.92	0.33	27.8	C		
							16.6	B
R	1583	1583	0.67	1.00	1.1	A		
Northbound								
T	2385	5074	0.88	0.47	18.4	B	14.1	B
R	1583	1583	0.41	1.00	0.2	A		
Southbound								
T	3180	6765	0.67	0.47	12.8	B	51.6	D
R	1583	1583	1.20	1.00	95.1	F		

Intersection Delay = 31.0 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1397		1003		1987	620		2023	1800
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				368		264		523	163		532	474
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				1471		1056		2092	653		2129	1895
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right	A	A	
Green		20.0	0.0			14.3	7.7	0.0
Yellow		3.6				4.7	4.7	
All Red		2.0				1.5	1.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1397		1003		1987	620		2023	1800
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				1471		1056		2092	653		2129	1895
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
Lane group				L		R		T	R		T	R
Adj flow				1471		1056		2092	653		2129	1895
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		T		R
So				1900		1900	1900	1900		1900		1900
Lanes	0	0	0	3	0	1	0 3	1	0	4		1
fW				1.000		1.000	1.000	1.000		1.000		1.000
fHV				0.980		0.980	0.980	0.980		0.980		0.980
fG				1.000		1.000	1.000	1.000		1.000		1.000
fP				1.000		1.000	1.000	1.000		1.000		1.000
fBB				1.000		1.000	1.000	1.000		1.000		1.000
fA				1.000		1.000	1.000	1.000		1.000		1.000
fLU				0.908		1.000	0.908	1.000		0.908		1.000
fRT						0.850	1.000	0.850		1.000		0.850
fLT				0.950			1.000			1.000		
Sec.												
fLpb				1.000			1.000			1.000		
fRpb						1.000	1.000	1.000		1.000		1.000
S				4820		1583	5074	1583		6765		1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Westbound							
Prot							
Perm							
Left	L	1471	4820	0.31	0.33	1607	0.92
Prot							
Perm							
Thru							
Right	R	1056	1583	0.67	1.00	1583	0.67
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	2092	5074	0.41	0.47	2385	0.88
Right	R	653	1583	0.41	1.00	1583	0.41
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	2129	6765	0.31	0.47	3180	0.67
Right	R	1895	1583	# 1.20	1.00	1583	1.20

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.20
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.20

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.92	0.33	19.2	1.000	1607	0.43	8.6	0.0	27.8	C		
											16.6	B
R	0.67	1.00	0.0	0.950	1583	0.24	1.1	0.0	1.1	A		
Northbound												
T	0.88	0.47	14.3	1.000	2385	0.40	4.1	0.0	18.4	B	14.1	B
R	0.41	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.67	0.47	12.3	1.000	3180	0.24	0.6	0.0	12.8	B	51.6 D
R	1.20	1.00	0.0	0.950	1583	0.50	95.1	0.0	95.1	F	

Intersection delay = 31.0 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT				0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	20.0	19.2	0.00	0.0	0.0	27.8
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.1
Northbound								
	0.0						0.0	
T	0.0	0.00	15.9	14.3	0.00	0.0	0.0	18.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	15.9	12.3	0.00	0.0	0.0	12.8
R	0.0	0.00	0.0	0.0	0.00	78.0	0.0	95.1

Intersection Delay 31.0 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup			L	R	T	R	T	R	
Init Queue			0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate			540	1056	767	653	586	1895	
So			1900	1900	1900	1900	1900	1900	
No.Lanes	0	0 0	3	0 1	0 3	1	0 4	1	
SL			1769	1583	1862	1583	1862	1583	
LnCapacity			589	1583	875	1583	875	1583	
Flow Ratio			0.3	0.7	0.4	0.4	0.3	1.2	
v/c Ratio			0.92	0.67	0.88	0.41	0.67	1.20	
Grn Ratio			0.33	1.00	0.47	1.00	0.47	1.00	
I Factor			1.000		1.000		1.000		
AT or PVG			3	3	3	3	3	3	
Pltn Ratio			1.00	1.00	1.00	1.00	1.00	1.00	
PF2			1.00		1.00		1.00		
Q1			8.6		11.5		7.6		
kB			0.4	0.7	0.5	0.7	0.5	0.7	
Q2			2.9	1.4	2.9	0.5	1.0	42.9	
Q Average			11.6		14.4		8.5		
Q Spacing			25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage			0	0	0	0	0	0	
Q S Ratio									
70th Percentile Output:									
fB%			1.2		1.2		1.2		
BOQ			13.6		16.9		10.1		
QSRatio									
85th Percentile Output:									
fB%			1.5		1.5		1.5		
BOQ			17.4		21.4		13.0		
QSRatio									
90th Percentile Output:									
fB%			1.6		1.6		1.7		
BOQ			18.8		23.0		14.2		
QSRatio									
95th Percentile Output:									
fB%			1.8		1.8		1.9		
BOQ			21.0		25.5		16.0		
QSRatio									
98th Percentile Output:									
fB%			2.1		2.0		2.2		
BOQ			24.4		29.3		18.9		
QSRatio									

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 NB Ramps

Inter.: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Volume				1397		1003		1987	620		2023	1800
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right	A	A	
Green	20.0	0.0				14.3	7.7	0.0
Yellow	3.6					4.7	4.7	
All Red	2.0					1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1607	4820	0.92	0.33	27.8	C		
							16.6	B
R	1583	1583	0.67	1.00	1.1	A		
Northbound								
T	2385	5074	0.88	0.47	18.4	B	14.1	B
R	1583	1583	0.41	1.00	0.2	A		
Southbound								
T	3180	6765	0.67	0.47	12.8	B	51.6	D
R	1583	1583	1.20	1.00	95.1	F		

Intersection Delay = 31.0 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1397		1003		1987	620		2023	1800
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				368		264		523	163		532	474
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				1471		1056		2092	653		2129	1895
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right	A	A	
Green		20.0	0.0			14.3	7.7	0.0
Yellow		3.6				4.7	4.7	
All Red		2.0				1.5	1.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1397		1003		1987	620		2023	1800
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				1471		1056		2092	653		2129	1895
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
Lane group				L		R		T	R		T	R
Adj flow				1471		1056		2092	653		2129	1895
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		T		R
So				1900		1900	1900	1900		1900		1900
Lanes	0	0	0	3	0	1	0 3	1	0	4		1
fW				1.000		1.000	1.000	1.000		1.000		1.000
fHV				0.980		0.980	0.980	0.980		0.980		0.980
fG				1.000		1.000	1.000	1.000		1.000		1.000
fP				1.000		1.000	1.000	1.000		1.000		1.000
fBB				1.000		1.000	1.000	1.000		1.000		1.000
fA				1.000		1.000	1.000	1.000		1.000		1.000
fLU				0.908		1.000	0.908	1.000		0.908		1.000
fRT						0.850	1.000	0.850		1.000		0.850
fLT				0.950			1.000			1.000		
Sec.												
fLpb				1.000			1.000			1.000		
fRpb						1.000	1.000	1.000		1.000		1.000
S				4820		1583	5074	1583		6765		1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Westbound							
Prot							
Perm							
Left	L	1471	4820	0.31	0.33	1607	0.92
Prot							
Perm							
Thru							
Right	R	1056	1583	0.67	1.00	1583	0.67
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	2092	5074	0.41	0.47	2385	0.88
Right	R	653	1583	0.41	1.00	1583	0.41
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	2129	6765	0.31	0.47	3180	0.67
Right	R	1895	1583	# 1.20	1.00	1583	1.20

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.20
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.20

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.92	0.33	19.2	1.000	1607	0.43	8.6	0.0	27.8	C		
											16.6	B
R	0.67	1.00	0.0	0.950	1583	0.24	1.1	0.0	1.1	A		
Northbound												
T	0.88	0.47	14.3	1.000	2385	0.40	4.1	0.0	18.4	B	14.1	B
R	0.41	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.67	0.47	12.3	1.000	3180	0.24	0.6	0.0	12.8	B	51.6 D
R	1.20	1.00	0.0	0.950	1583	0.50	95.1	0.0	95.1	F	

Intersection delay = 31.0 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT				0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	20.0	19.2	0.00	0.0	0.0	27.8
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.1
Northbound								
	0.0						0.0	
T	0.0	0.00	15.9	14.3	0.00	0.0	0.0	18.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	15.9	12.3	0.00	0.0	0.0	12.8
R	0.0	0.00	0.0	0.0	0.00	78.0	0.0	95.1

Intersection Delay 31.0 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup			L	R	T	R	T	R	
Init Queue			0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate			540	1056	767	653	586	1895	
So			1900	1900	1900	1900	1900	1900	
No.Lanes	0	0 0	3	0 1	0 3	1	0 4	1	
SL			1769	1583	1862	1583	1862	1583	
LnCapacity			589	1583	875	1583	875	1583	
Flow Ratio			0.3	0.7	0.4	0.4	0.3	1.2	
v/c Ratio			0.92	0.67	0.88	0.41	0.67	1.20	
Grn Ratio			0.33	1.00	0.47	1.00	0.47	1.00	
I Factor			1.000		1.000		1.000		
AT or PVG			3	3	3	3	3	3	
Pltn Ratio			1.00	1.00	1.00	1.00	1.00	1.00	
PF2			1.00		1.00		1.00		
Q1			8.6		11.5		7.6		
kB			0.4	0.7	0.5	0.7	0.5	0.7	
Q2			2.9	1.4	2.9	0.5	1.0	42.9	
Q Average			11.6		14.4		8.5		
Q Spacing			25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage			0	0	0	0	0	0	
Q S Ratio									
70th Percentile Output:									
fB%			1.2		1.2		1.2		
BOQ			13.6		16.9		10.1		
QSRatio									
85th Percentile Output:									
fB%			1.5		1.5		1.5		
BOQ			17.4		21.4		13.0		
QSRatio									
90th Percentile Output:									
fB%			1.6		1.6		1.7		
BOQ			18.8		23.0		14.2		
QSRatio									
95th Percentile Output:									
fB%			1.8		1.8		1.9		
BOQ			21.0		25.5		16.0		
QSRatio									
98th Percentile Output:									
fB%			2.1		2.0		2.2		
BOQ			24.4		29.3		18.9		
QSRatio									

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 SB Ramps

Inter.: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Volume	743	0	1992					1857	650		3108	290
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	60.6	0.0				13.1	37.9	0.0	
Yellow	3.5					4.7	4.7		
All Red	1.5					2.0	2.0		

Cycle Length: 130.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	825	1770	0.95	0.47	53.0	D		
LTR	868	1863	0.00	0.47	18.5	B	240.4	F
R	1307	2803	1.60	0.47	310.3	F		
Westbound								
Northbound								
T	3003	6765	0.65	0.44	28.8	C	21.4	C
R	1583	1583	0.43	1.00	0.2	A		
Southbound								
T	3003	6765	1.09	0.44	82.8	F	75.7	E
R	1583	1583	0.19	1.00	0.1	A		

Intersection Delay = 112.1 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	743	0	1992					1857	650		3108	290
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	196	0	524					489	171		818	76
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L		LTR R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	782	0	2097					1955	684		3272	305
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	60.6	0.0			13.1	37.9	0.0	
Yellow	3.5				4.7	4.7		
All Red	1.5				2.0	2.0		

Cycle Length: 130.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	743	0	1992					1857	650		3108	290
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	782	0	2097					1955	684		3272	305
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
Lane group	L		LTR R					T	R		T	R
Adj flow	782	0	2097					1955	684		3272	305
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound							Northbound							Southbound						
LG	L		LTR	R											T	R						T	R				
So	1900		1900	1900											1900	1900						1900	1900				
Lanes	1		1	2		0		0		0		0			4	1		0				4	1				
fW	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fHV	0.980		0.980	0.980											0.980	0.980						0.980	0.980				
fG	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fP	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fBB	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fA	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fLU	1.000		1.000	0.885											0.908	1.000						0.908	1.000				
fRT			1.000	0.850											1.000	0.850						1.000	0.850				
fLT	0.950		1.000												1.000							1.000					
Sec.																											
fLpb	1.000		1.000												1.000							1.000					
fRpb			1.000	1.000											1.000	1.000						1.000	1.000				
S	1770		1863	2803											6765	1583						6765	1583				
Sec.																											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	782	1770		0.44	0.47	825	0.95
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.47	868	0.00
Right	R	2097	2803	#	0.75	0.47	1307	1.60
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1955	6765		0.29	0.44	3003	0.65
Right	R	684	1583		0.43	1.00	1583	0.43
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	3272	6765	#	0.48	0.44	3003	1.09
Right	R	305	1583		0.19	1.00	1583	0.19

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.23
Total lost time per cycle, L = 11.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.35

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.95	0.47	33.2	1.000	825	0.46	19.8	0.0	53.0	D		
LTR	0.00	0.47	18.5	1.000	868	0.11	0.0	0.0	18.5	B	240.4	F
R	1.60	0.47	34.7	1.000	1307	0.50	275.6	0.0	310.3	F		
Westbound												
Northbound												
T	0.65	0.44	28.3	1.000	3003	0.23	0.5	0.0	28.8	C	21.4	C
R	0.43	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	1.09	0.44	36.1	1.000	3003	0.50	46.6	0.0	82.8	F	75.7 E
R	0.19	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A	

Intersection delay = 112.1 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 130.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 130.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	130.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	34.7	33.2	0.00	0.0	0.0	53.0

LTR	0.0	0.00	34.7	18.5	0.00	0.0	0.0	18.5
R	0.0	0.00	34.7	34.7	0.00	197.5	0.0	310.3
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	36.1	28.3	0.00	0.0	0.0	28.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	36.1	36.1	0.00	67.2	0.0	82.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 112.1 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	782	0	1184				538	684		900	305	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	2	0	0	0	4	1	0	4	1	
SL	1770	1863	1584				1862	1583		1862	1583	
LnCapacity	825	868	738				826	1583		826	1583	
Flow Ratio	0.4	0.0	0.7				0.3	0.4		0.5	0.2	
v/c Ratio	0.95	0.00	1.60				0.65	0.43		1.09	0.19	
Grn Ratio	0.47	0.47	0.47				0.44	1.00		0.44	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	27.0	0.0	42.8				15.2			32.5		
kB	0.8	0.8	0.7				0.8	1.1		0.8	1.1	
Q2	6.4	0.0	57.6				1.4	0.9		15.0	0.3	
Q Average	33.4	0.0	100.3				16.6			47.5		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.1				1.2			1.1		
BOQ	38.2	0.0	111				19.3			53.7		
QSRatio												
85th Percentile Output:												
fB%	1.4	1.6	1.3				1.5			1.4		
BOQ	46.7	0.0	132				24.4			64.7		
QSRatio												
90th Percentile Output:												
fB%	1.5	1.8	1.4				1.6			1.4		
BOQ	49.3	0.0	141				26.1			68.3		
QSRatio												
95th Percentile Output:												
fB%	1.6	2.1	1.5				1.7			1.5		
BOQ	53.2	0.0	151				28.8			73.3		
QSRatio												
98th Percentile Output:												
fB%	1.8	2.7	1.7				2.0			1.7		
BOQ	59.3	0.0	171				32.8			82.0		
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 SB Ramps
Inter.: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Volume	1463	0	1228					3337	1120		3082	680
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	55.0	0.0				12.7	43.8	0.0	
Yellow	3.5					4.7	4.7		
All Red	1.5					2.0	2.0		

Cycle Length: 129.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	749	1770	2.06	0.42	517.3	F		
LTR	789	1863	0.00	0.42	21.6	C	322.9	F
R	1187	2803	1.09	0.42	91.4	F		
Westbound								
Northbound								
T	3291	6765	1.07	0.49	70.7	E	53.5	D
R	1583	1583	0.74	1.00	2.0	A		
Southbound								
T	3291	6765	0.99	0.49	45.4	D	37.2	D
R	1583	1583	0.45	1.00	0.2	A		

Intersection Delay = 114.3 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Jamboree at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	1463	0	1228					3337	1120		3082	680
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	385	0	323					878	295		811	179
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	1540	0	1293					3513	1179		3244	716
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	55.0	0.0			12.7	43.8	0.0	
Yellow	3.5				4.7	4.7		
All Red	1.5				2.0	2.0		

Cycle Length: 129.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	1463	0	1228					3337	1120		3082	680
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	1540	0	1293					3513	1179		3244	716
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	1540	0	1293					3513	1179		3244	716
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound				Northbound			Southbound	
LG	L		LTR	R								T	R		T	R
So	1900		1900	1900								1900	1900		1900	1900
Lanes	1		1	2	0	0	0	0				4	1	0	4	1
fW	1.000		1.000	1.000								1.000	1.000		1.000	1.000
fHV	0.980		0.980	0.980								0.980	0.980		0.980	0.980
fG	1.000		1.000	1.000								1.000	1.000		1.000	1.000
fP	1.000		1.000	1.000								1.000	1.000		1.000	1.000
fBB	1.000		1.000	1.000								1.000	1.000		1.000	1.000
fA	1.000		1.000	1.000								1.000	1.000		1.000	1.000
fLU	1.000		1.000	0.885								0.908	1.000		0.908	1.000
fRT			1.000	0.850								1.000	0.850		1.000	0.850
fLT	0.950		1.000									1.000			1.000	
Sec.																
fLpb	1.000		1.000									1.000			1.000	
fRpb			1.000	1.000								1.000	1.000		1.000	1.000
S	1770		1863	2803								6765	1583		6765	1583
Sec.																

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	1540	1770	#	0.87	0.42	749	2.06
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.42	789	0.00
Right	R	1293	2803		0.46	0.42	1187	1.09
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	3513	6765	#	0.52	0.49	3291	1.07
Right	R	1179	1583		0.74	1.00	1583	0.74
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	3244	6765		0.48	0.49	3291	0.99
Right	R	716	1583		0.45	1.00	1583	0.45

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.39
Total lost time per cycle, L = 11.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.53

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	2.06	0.42	37.4	1.000	749	0.50	479.9	0.0	517.3	F		
LTR	0.00	0.42	21.6	1.000	789	0.11	0.0	0.0	21.6	C	322.9	F
R	1.09	0.42	37.4	1.000	1187	0.50	54.0	0.0	91.4	F		
Westbound												
Northbound												
T	1.07	0.49	33.3	1.000	3291	0.50	37.4	0.0	70.7	E	53.5	D
R	0.74	1.00	0.0	0.950	1583	0.30	2.0	0.0	2.0	A		
Southbound												

T	0.99	0.49	32.9	1.000	3291	0.49	12.5	0.0	45.4	D	37.2	D
R	0.45	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 114.3 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 129.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 129.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	129.9 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	37.4	37.4	0.00	197.8	0.0	517.3

LTR	0.0	0.00	37.4	21.6	0.00	0.0	0.0	21.6
R	0.0	0.00	37.4	37.4	0.00	26.5	0.0	91.4
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	33.3	33.3	0.00	55.5	0.0	70.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.0
Southbound								
	0.0						0.0	
T	0.0	0.00	33.3	32.9	0.00	0.0	0.0	45.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 114.3 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				T	R		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	1540	0	730				967	1179		893	716	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	2	0	0	0	4	1	0	4	1	
SL	1770	1863	1584				1862	1583		1862	1583	
LnCapacity	749	789	670				906	1583		906	1583	
Flow Ratio	0.9	0.0	0.5				0.5	0.7		0.5	0.5	
v/c Ratio	2.06	0.00	1.09				1.07	0.74		0.99	0.45	
Grn Ratio	0.42	0.42	0.42				0.49	1.00		0.49	1.00	
I Factor		1.000					1.000			1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00			1.00		
Q1	55.6	0.0	26.3				34.9			31.8		
kB	0.7	0.7	0.7				0.8	1.1		0.8	1.1	
Q2	100.3		0.0	12.5				14.4	3.1		8.7	
Q Average	155.8		0.0	38.8				49.3			40.5	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.1				1.1			1.1		
BOQ	172	0.0	44.1				55.7			46.0		
QSRatio												
85th Percentile Output:												
fB%	1.3	1.6	1.4				1.4			1.4		
BOQ	203	0.0	53.6				67.0			55.8		
QSRatio												
90th Percentile Output:												
fB%	1.4	1.8	1.5				1.4			1.5		
BOQ	218	0.0	56.5				70.7			58.9		
QSRatio												
95th Percentile Output:												
fB%	1.5	2.1	1.6				1.5			1.6		
BOQ	234	0.0	60.9				75.9			63.3		
QSRatio												
98th Percentile Output:												
fB%	1.7	2.7	1.8				1.7			1.7		
BOQ	265	0.0	67.9				84.9			70.7		
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Volume				1046		727		2513	257	233	1604	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	29.4	0.0			6.2	14.1	16.9	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1123	3437	0.98	0.33	52.2	D		
							45.1	D
R	916	2803	0.84	0.33	34.8	C		
Northbound								
T	2804	6765	0.94	0.41	32.9	C	31.4	C
R	1162	2803	0.23	0.41	17.2	B		
Southbound								
L	237	3437	1.03	0.07	109.4	F		
T	3661	6765	0.46	0.54	12.7	B	25.0	C

Intersection Delay = 33.3 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Macarthur at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1046		727		2513	257	233	1604	
% Heavy Veh				2		2		2	2	2	2	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol				275		191		661	68	61	422	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			
Adj Flow				1101		765		2645	271	245	1688	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000	0.000		
Peds Bikes	0			0			0					
Buses				0		0		0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type				3		3		3	3	3	3	
Unit Ext.				3.0		3.0		3.0	3.0	3.0	3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g				2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	29.4	0.0			6.2	14.1	16.9	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1046		727		2513	257	233	1604	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow				1101		765		2645	271	245	1688	
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
Lane group				L		R		T	R	L	T	
Adj flow				1101		765		2645	271	245	1688	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000	0.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T	R	L	T		
So			1900		1900		1900	1900	1900	1900		
Lanes	0	0	2	0	2	0	4	2	2	4	0	
fW			1.000		1.000		1.000	1.000	1.000	1.000		
fHV			0.980		0.980		0.980	0.980	0.980	0.980		
fG			1.000		1.000		1.000	1.000	1.000	1.000		
fP			1.000		1.000		1.000	1.000	1.000	1.000		
fBB			1.000		1.000		1.000	1.000	1.000	1.000		
fA			1.000		1.000		1.000	1.000	1.000	1.000		
fLU			0.971		0.885		0.908	0.885	0.971	0.908		
fRT					0.850		1.000	0.850		1.000		
fLT			0.950				1.000		0.950	1.000		
Sec.												
fLpb			1.000				1.000		1.000	1.000		
fRpb					1.000		1.000	1.000		1.000		
S			3437		2803		6765	2803	3437	6765		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group		Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru									
Right									
Westbound									
Prot									
Perm									
Left	L		1101	3437	#	0.32	0.33	1123	0.98
Prot									
Perm									
Thru									
Right	R		765	2803		0.27	0.33	916	0.84
Northbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru	T		2645	6765	#	0.39	0.41	2804	0.94
Right	R		271	2803		0.10	0.41	1162	0.23
Southbound									
Prot									
Perm									
Left	L		245	3437	#	0.07	0.07	237	1.03
Prot									
Perm									
Thru	T		1688	6765		0.25	0.54	3661	0.46
Right									

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.78
Total lost time per cycle, L = 17.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.97

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.98	0.33	30.0	1.000	1123	0.48	22.1	0.0	52.2	D		
											45.1	D
R	0.84	0.33	28.1	1.000	916	0.37	6.8	0.0	34.8	C		
Northbound												
T	0.94	0.41	25.3	1.000	2804	0.46	7.5	0.0	32.9	C	31.4	C
R	0.23	0.41	17.1	1.000	1162	0.11	0.1	0.0	17.2	B		
Southbound												
L	1.03	0.07	41.9	1.000	237	0.50	67.5	0.0	109.4	F		

T 0.46 0.54 12.6 1.000 3661 0.11 0.1 0.0 12.7 B 25.0 C

Intersection delay = 33.3 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	90.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	30.3	30.0	0.00	0.0	0.0	52.2
	0.0						0.0	
R	0.0	0.00	30.3	28.1	0.00	0.0	0.0	34.8
Northbound								
	0.0						0.0	
T	0.0	0.00	26.4	25.3	0.00	0.0	0.0	32.9
R	0.0	0.00	26.4	17.1	0.00	0.0	0.0	17.2
Southbound								
L	0.0	0.00	41.9	41.9	0.00	2.0	0.0	109.4
T	0.0	0.00	20.7	12.6	0.00	0.0	0.0	12.7
	0.0						0.0	

Intersection Delay 33.3 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup				L	R	T	R	L	T	
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate				566	432	728	153	126	464	
So				1900	1900	1900	1900	1900	1900	
No.Lanes	0	0	0	2	0 2	0 4	2	2	4	0
SL				1770	1584	1862	1584	1770	1862	
LnCapacity				578	517	772	656	122	1007	
Flow Ratio				0.3	0.3	0.4	0.1	0.1	0.2	
v/c Ratio				0.98	0.84	0.94	0.23	1.03	0.46	
Grn Ratio				0.33	0.33	0.41	0.41	0.07	0.54	
I Factor				1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00	1.00	
Q1				14.0	10.0	17.5	2.5	3.2	7.1	
kB				0.5	0.5	0.6	0.5	0.2	0.7	
Q2				5.2	2.0	5.1	0.2	2.0	0.6	
Q Average				19.2	12.0	22.6	2.6	5.2	7.7	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage				0	0	0	0	0	0	
Q S Ratio										
70th Percentile Output:										
fB%				1.2	1.2	1.2	1.2	1.2	1.2	
BOQ				22.3	14.1	26.1	3.2	6.1	9.1	
QSRatio										
85th Percentile Output:										
fB%				1.5	1.5	1.4	1.6	1.6	1.5	
BOQ				28.0	18.0	32.5	4.2	8.0	11.8	
QSRatio										
90th Percentile Output:										
fB%				1.6	1.6	1.5	1.8	1.7	1.7	
BOQ				29.9	19.4	34.5	4.6	8.8	12.8	
QSRatio										
95th Percentile Output:										
fB%				1.7	1.8	1.7	2.0	2.0	1.9	
BOQ				32.8	21.7	37.7	5.3	10.1	14.5	
QSRatio										
98th Percentile Output:										
fB%				1.9	2.1	1.9	2.5	2.4	2.3	
BOQ				37.1	25.2	42.4	6.6	12.3	17.3	
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Volume				622		299		2301	974	616	2088	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	16.8	0.0			18.3	9.6	21.9	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	642	3437	1.02	0.19	77.3	E		
							63.7	E
R	523	2803	0.60	0.19	35.5	D		
Northbound								
T	2841	6765	0.85	0.42	26.3	C	27.7	C
R	1177	2803	0.87	0.42	31.2	C		
Southbound								
L	699	3437	0.93	0.20	53.7	D		
T	4608	6765	0.48	0.68	6.9	A	17.5	B

Intersection Delay = 28.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Macarthur at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				622		299		2301	974	616	2088	
% Heavy Veh				2		2		2	2	2	2	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol				164		79		606	256	162	549	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	0	0		2	0	2	0	4	2	2	4	0
LGConfig				L			R		T	R	L	T	
Lane Width				12.0			12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0				0			
Adj Flow				655		315		2422	1025	648	2198	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	
Peds Bikes	0			0				0				
Buses				0		0		0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type				3		3		3	3	3	3	
Unit Ext.				3.0		3.0		3.0	3.0	3.0	3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g				2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	16.8	0.0			18.3	9.6	21.9	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				622		299		2301	974	616	2088	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow				655		315		2422	1025	648	2198	
No. Lanes	0	0	0		2	0	2	0	4	2	2	4	0
Lane group				L			R		T	R	L	T	
Adj flow				655		315		2422	1025	648	2198	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		L	T	
So				1900		1900	1900	1900		1900	1900	
Lanes	0	0	0	2	0	2	0 4	2		2	4	0
fW				1.000		1.000	1.000	1.000		1.000	1.000	
fHV				0.980		0.980	0.980	0.980		0.980	0.980	
fG				1.000		1.000	1.000	1.000		1.000	1.000	
fP				1.000		1.000	1.000	1.000		1.000	1.000	
fBB				1.000		1.000	1.000	1.000		1.000	1.000	
fA				1.000		1.000	1.000	1.000		1.000	1.000	
fLU				0.971		0.885	0.908	0.885		0.971	0.908	
fRT						0.850	1.000	0.850			1.000	
fLT				0.950			1.000			0.950	1.000	
Sec.												
fLpb				1.000			1.000			1.000	1.000	
fRpb						1.000	1.000	1.000			1.000	
S				3437		2803	6765	2803		3437	6765	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	655	3437	#	0.19	0.19	642	1.02
Prot								
Perm								
Thru								
Right	R	315	2803		0.11	0.19	523	0.60
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2422	6765		0.36	0.42	2841	0.85
Right	R	1025	2803	#	0.37	0.42	1177	0.87
Southbound								
Prot								
Perm								
Left	L	648	3437	#	0.19	0.20	699	0.93
Prot								
Perm								
Thru	T	2198	6765		0.32	0.68	4608	0.48
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.74
Total lost time per cycle, L = 17.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.92

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.02	0.19	36.6	1.000	642	0.50	40.7	0.0	77.3	E		
											63.7	E
R	0.60	0.19	33.5	1.000	523	0.19	2.0	0.0	35.5	D		
Northbound												
T	0.85	0.42	23.6	1.000	2841	0.38	2.7	0.0	26.3	C	27.7	C
R	0.87	0.42	23.9	1.000	1177	0.40	7.3	0.0	31.2	C		
Southbound												
L	0.93	0.20	35.2	1.000	699	0.44	18.5	0.0	53.7	D		

T	0.48	0.68	6.8	1.000	4608	0.11	0.1	0.0	6.9	A	17.5	B

Intersection delay = 28.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	90.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	36.6	36.6	0.00	3.3	0.0	77.3
	0.0						0.0	
R	0.0	0.00	36.6	33.5	0.00	0.0	0.0	35.5
Northbound								
	0.0						0.0	
T	0.0	0.00	26.1	23.6	0.00	0.0	0.0	26.3
R	0.0	0.00	26.1	23.9	0.00	0.0	0.0	31.2
Southbound								
L	0.0	0.00	35.9	35.2	0.00	0.0	0.0	53.7
T	0.0	0.00	14.3	6.8	0.00	0.0	0.0	6.9
	0.0						0.0	

Intersection Delay 28.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L		R	T		R	L	T	
Init Queue				0.0		0.0	0.0		0.0	0.0	0.0	
Flow Rate				337		177	666		579	333	605	
So				1900		1900	1900		1900	1900	1900	
No.Lanes	0	0	0	2	0	2	0	4	2	2	4	0
SL				1770		1584	1862		1584	1770	1862	
LnCapacity				330		295	782		664	359	1268	
Flow Ratio				0.2		0.1	0.4		0.4	0.2	0.3	
v/c Ratio				1.02		0.60	0.85		0.87	0.93	0.48	
Grn Ratio				0.19		0.19	0.42		0.42	0.20	0.68	
I Factor				1.000			1.000			1.000		
AT or PVG				3		3	3		3	3	3	
Pltn Ratio				1.00		1.00	1.00		1.00	1.00	1.00	
PF2				1.00		1.00	1.00		1.00	1.00	1.00	
Q1				8.4		4.1	15.0		13.2	8.2	7.1	
kB				0.4		0.3	0.6		0.5	0.4	0.8	
Q2				4.3		0.5	2.9		2.9	2.6	0.7	
Q Average				12.8		4.5	17.9		16.1	10.8	7.9	
Q Spacing				25.0		25.0	25.0		25.0	25.0	25.0	
Q Storage				0		0	0		0	0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.2		1.2	1.2		1.2	1.2	1.2	
BOQ				15.0		5.4	20.8		18.8	12.7	9.3	
QSRatio												
85th Percentile Output:												
fB%				1.5		1.6	1.5		1.5	1.5	1.5	
BOQ				19.1		7.1	26.2		23.8	16.3	12.0	
QSRatio												
90th Percentile Output:												
fB%				1.6		1.7	1.6		1.6	1.6	1.7	
BOQ				20.6		7.8	28.0		25.5	17.7	13.1	
QSRatio												
95th Percentile Output:												
fB%				1.8		2.0	1.7		1.7	1.8	1.9	
BOQ				22.9		8.9	30.8		28.2	19.8	14.8	
QSRatio												
98th Percentile Output:												
fB%				2.1		2.4	2.0		2.0	2.1	2.2	
BOQ				26.5		10.9	34.9		32.1	23.1	17.7	
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				1024	248	1128		1601	374	221	1786	618
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	22.2	0.0				5.7	4.7	10.6 0.0
Yellow	4.0					3.2	4.3	4.3
All Red	1.5					0.8	1.8	1.8

Cycle Length: 64.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1176	3437	0.92	0.34	31.7	C		
T	637	1863	0.41	0.34	16.8	B	16.2	B
R	1583	1583	0.75	1.00	2.0	A		
Northbound								
T	2231	6765	0.76	0.33	20.9	C	21.8	C
R	522	1583	0.75	0.33	25.6	C		
Southbound								
L	302	3437	0.77	0.09	40.6	D		
T	3242	6765	0.58	0.48	12.5	B	17.7	B
R	759	1583	0.86	0.48	24.6	C		

Intersection Delay = 18.4 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Macarthur at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1024	248	1128		1601	374	221	1786	618
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				269	65	297		421	98	58	470	163
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L		T	R		T	R	L		T	R
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0	
Adj Flow				1078	261	1187		1685	394	233	1880	651
%InSharedLn												
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0	0	0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	22.2	0.0				5.7	4.7	10.6	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 64.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1024	248	1128		1601	374	221	1786	618
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				1078	261	1187		1685	394	233	1880	651
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
Lane group				L		T	R		T	R	L		T	R
Adj flow				1078	261	1187		1685	394	233	1880	651
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	1078	3437		0.31	0.34	1176	0.92
Prot								
Perm								
Thru	T	261	1863		0.14	0.34	637	0.41
Right	R	1187	1583	#	0.75	1.00	1583	0.75
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1685	6765		0.25	0.33	2231	0.76
Right	R	394	1583		0.25	0.33	522	0.75
Southbound								
Prot								
Perm								
Left	L	233	3437		0.07	0.09	302	0.77
Prot								
Perm								
Thru	T	1880	6765		0.28	0.48	3242	0.58
Right	R	651	1583		0.41	0.48	759	0.86

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.75
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.75

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.92	0.34	20.5	1.000	1176	0.44	11.3	0.0	31.7	C		
T	0.41	0.34	16.3	1.000	637	0.11	0.4	0.0	16.8	B	16.2	B
R	0.75	1.00	0.0	0.950	1583	0.30	2.0	0.0	2.0	A		
Northbound												
T	0.76	0.33	19.4	1.000	2231	0.31	1.5	0.0	20.9	C	21.8	C
R	0.75	0.33	19.4	1.000	522	0.31	6.2	0.0	25.6	C		
Southbound												
L	0.77	0.09	29.0	1.000	302	0.32	11.6	0.0	40.6	D		

T	0.58	0.48	12.2	1.000	3242	0.17	0.3	0.0	12.5	B	17.7	B
R	0.86	0.48	14.9	1.000	759	0.39	9.7	0.0	24.6	C		

Intersection delay = 18.4 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	64.9 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	64.9 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	64.9 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	21.4	20.5	0.00	0.0	0.0	31.7
T	0.0	0.00	21.4	16.3	0.00	0.0	0.0	16.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.0
Northbound								
	0.0						0.0	
T	0.0	0.00	21.8	19.4	0.00	0.0	0.0	20.9
R	0.0	0.00	21.8	19.4	0.00	0.0	0.0	25.6
Southbound								
L	0.0	0.00	29.6	29.0	0.00	0.0	0.0	40.6
T	0.0	0.00	16.9	12.2	0.00	0.0	0.0	12.5
R	0.0	0.00	16.9	14.9	0.00	0.0	0.0	24.6

Intersection Delay 18.4 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound		
LaneGroup				L	T	R	T	R	L	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				555	261	1187	463	394	119	517	651
So				1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	1	1	4	1	2	4	1
SL				1770	1863	1583	1862	1583	1770	1862	1583
LnCapacity				605	637	1583	614	522	155	892	759
Flow Ratio				0.3	0.1	0.7	0.2	0.2	0.1	0.3	0.4
v/c Ratio				0.92	0.41	0.75	0.75	0.75	0.77	0.58	0.86
Grn Ratio				0.34	0.34	1.00	0.33	0.33	0.09	0.48	0.48
I Factor					1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1				9.6	3.6		7.4	6.3	2.1	6.7	10.4
kB				0.4	0.4	0.7	0.4	0.4	0.2	0.5	0.5
Q2				3.1	0.3	2.1	1.2	1.1	0.5	0.7	2.5
Q Average				12.7	3.9		8.7	7.4	2.6	7.4	12.8
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0	0
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2		1.2	1.2	1.2	1.2	1.2
BOQ				14.9	4.6		10.2	8.8	3.2	8.8	15.0
QSRatio											
85th Percentile Output:											
fB%				1.5	1.6		1.5	1.5	1.6	1.5	1.5
BOQ				19.0	6.1		13.2	11.4	4.2	11.4	19.2
QSRatio											
90th Percentile Output:											
fB%				1.6	1.7		1.7	1.7	1.8	1.7	1.6
BOQ				20.5	6.7		14.4	12.5	4.6	12.5	20.7
QSRatio											
95th Percentile Output:											
fB%				1.8	2.0		1.9	1.9	2.0	1.9	1.8
BOQ				22.8	7.7		16.2	14.1	5.3	14.1	23.0
QSRatio											
98th Percentile Output:											
fB%				2.1	2.4		2.2	2.3	2.5	2.3	2.1
BOQ				26.4	9.5		19.2	16.9	6.7	16.8	26.6
QSRatio											

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				712	291	611		2649	733	617	1688	459
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	19.2	0.0				19.9	27.1	7.2	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 95.1 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	694	3437	1.08	0.20	95.5	F		
T	376	1863	0.81	0.20	49.1	D	51.0	D
R	1583	1583	0.41	1.00	0.2	A		
Northbound								
T	2874	6765	0.97	0.42	37.5	D	53.4	D
R	672	1583	1.15	0.42	110.9	F		
Southbound								
L	719	3437	0.90	0.21	51.4	D		
T	4574	6765	0.39	0.68	6.8	A	16.9	B
R	1070	1583	0.45	0.68	7.5	A		

Intersection Delay = 39.9 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Macarthur at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				712	291	611		2649	733	617	1688	459
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				187	77	161		697	193	162	444	121
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L		T	R		T	R	L		T	R
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0
Adj Flow				749	306	643		2788	772	649	1777	483
%InSharedLn												
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0	0	0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	19.2	0.0				19.9	27.1	7.2	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 95.1 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				712	291	611		2649	733	617	1688	459
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				749	306	643		2788	772	649	1777	483
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
Lane group				L		T	R		T	R	L		T	R
Adj flow				749	306	643		2788	772	649	1777	483
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	749	3437	#	0.22	0.20	694	1.08
Prot								
Perm								
Thru	T	306	1863		0.16	0.20	376	0.81
Right	R	643	1583		0.41	1.00	1583	0.41
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2788	6765		0.41	0.42	2874	0.97
Right	R	772	1583	#	0.49	0.42	672	1.15
Southbound								
Prot								
Perm								
Left	L	649	3437	#	0.19	0.21	719	0.90
Prot								
Perm								
Thru	T	1777	6765		0.26	0.68	4574	0.39
Right	R	483	1583		0.31	0.68	1070	0.45

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.89
Total lost time per cycle, L = 15.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.07

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.08	0.20	38.0	1.000	694	0.50	57.6	0.0	95.5	F		
T	0.81	0.20	36.2	1.000	376	0.35	12.9	0.0	49.1	D	51.0	D
R	0.41	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Northbound												
T	0.97	0.42	26.8	1.000	2874	0.48	10.8	0.0	37.5	D	53.4	D
R	1.15	0.42	27.4	1.000	672	0.50	83.5	0.0	110.9	F		
Southbound												
L	0.90	0.21	36.7	1.000	719	0.42	14.7	0.0	51.4	D		

T	0.39	0.68	6.8	1.000	4574	0.11	0.1	0.0	6.8	A	16.9	B
R	0.45	0.68	7.2	1.000	1070	0.11	0.3	0.0	7.5	A		

Intersection delay = 39.9 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.1 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.1 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.1 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	38.0	38.0	0.00	13.7	0.0	95.5
T	0.0	0.00	38.0	36.2	0.00	0.0	0.0	49.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Northbound								
	0.0						0.0	
T	0.0	0.00	27.4	26.8	0.00	0.0	0.0	37.5
R	0.0	0.00	27.4	27.4	0.00	25.0	0.0	110.9
Southbound								
L	0.0	0.00	37.6	36.7	0.00	0.0	0.0	51.4
T	0.0	0.00	15.4	6.8	0.00	0.0	0.0	6.8
R	0.0	0.00	15.4	7.2	0.00	0.0	0.0	7.5

Intersection Delay 39.9 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound		
LaneGroup				L	T	R	T	R	L	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				385	306	643	767	772	334	489	483
So				1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	1	1	4	1	2	4	1
SL				1770	1863	1583	1862	1583	1770	1862	1583
LnCapacity				357	376	1583	791	672	370	1259	1070
Flow Ratio				0.2	0.2	0.4	0.4	0.5	0.2	0.3	0.3
v/c Ratio				1.08	0.81	0.41	0.97	1.15	0.90	0.39	0.45
Grn Ratio				0.20	0.20	1.00	0.42	0.42	0.21	0.68	0.68
I Factor					1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1				10.2	7.7		19.8	20.4	8.6	5.7	5.9
kB				0.4	0.4	0.9	0.6	0.6	0.4	0.8	0.7
Q2				6.4	1.5	0.6	6.4	15.9	2.4	0.5	0.6
Q Average				16.6	9.2		26.2	36.3	11.0	6.2	6.6
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0	0
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2		1.2	1.1	1.2	1.2	1.2
BOQ				19.3	10.9		30.1	41.4	12.9	7.3	7.8
QSRatio											
85th Percentile Output:											
fB%				1.5	1.5		1.4	1.4	1.5	1.5	1.5
BOQ				24.4	14.0		37.3	50.4	16.6	9.6	10.1
QSRatio											
90th Percentile Output:											
fB%				1.6	1.7		1.5	1.5	1.6	1.7	1.7
BOQ				26.1	15.2		39.5	53.2	17.9	10.5	11.1
QSRatio											
95th Percentile Output:											
fB%				1.7	1.9		1.6	1.6	1.8	1.9	1.9
BOQ				28.8	17.1		42.9	57.4	20.1	11.9	12.6
QSRatio											
98th Percentile Output:											
fB%				2.0	2.2		1.8	1.8	2.1	2.3	2.3
BOQ				32.8	20.2		48.0	63.9	23.4	14.4	15.1
QSRatio											

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 NB Ramps

Inter.: Baker at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
LGConfig	L	T			T	R	L	LTR				
Volume	705	2055			271	188	399	436	615			
Lane Width	12.0	12.0			12.0	12.0	12.0	12.0				
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	35.4	7.4	15.9	0.0		37.6	0.0		
Yellow	3.2	4.0	4.0			3.5			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 115.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1058	3437	0.70	0.31	37.2	D		
T	2094	3547	1.03	0.59	52.3	D	48.4	D
Westbound								
T	873	3547	0.33	0.25	35.8	D	36.9	D
R	390	1583	0.51	0.25	38.4	D		
Northbound								
L	579	1770	0.73	0.33	38.7	D		
LTR	1058	3235	1.05	0.33	79.0	E	67.9	E
Southbound								

Intersection Delay = 53.3 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Baker at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 NB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	705	2055			271	188	399	436	615			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	186	541			71	49	105	115	162			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900	1900	1900				
ParkExist												
NumPark												
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
LGConfig	L	T			T	R	L	LTR				
Lane Width	12.0	12.0			12.0	12.0	12.0	12.0				
RTOR Vol					0			0				
Adj Flow	742	2163			285	198	420	1106				
%InSharedLn							0					
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000			0.000	1.000		0.585				
Peds Bikes					0			0			0	
Buses	0	0			0	0	0	0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0	0.0	0.0				
Arriv. Type	3	3			3	3	3	3				
Unit Ext.	3.0	3.0			3.0	3.0	3.0	3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0	2.0	2.0				
Ext of g	2.0	2.0			2.0	2.0	2.0	2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	35.4	7.4	15.9	0.0		37.6	0.0	
Yellow	3.2	4.0	4.0			3.5		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 115.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	705	2055			271	188	399	436	615			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	742	2163			285	198	420	459	647			
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
Lane group	L	T			T	R	L	LTR				
Adj flow	742	2163			285	198	420	1106				
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000			0.000	1.000		0.585				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound		Northbound		Southbound			
LG	L	T			T	R	L	LTR				
So	1900	1900			1900	1900	1900	1900				
Lanes	2	2	0	0	2	1	1	2	0	0	0	0
fW	1.000	1.000			1.000	1.000	1.000	1.000				
fHV	0.980	0.980			0.980	0.980	0.980	0.980				
fG	1.000	1.000			1.000	1.000	1.000	1.000				
fP	1.000	1.000			1.000	1.000	1.000	1.000				
fBB	1.000	1.000			1.000	1.000	1.000	1.000				
fA	1.000	1.000			1.000	1.000	1.000	1.000				
fLU	0.971	0.952			0.952	1.000	1.000	0.952				
fRT		1.000			1.000	0.850		0.912				
fLT	0.950	1.000			1.000		0.950	1.000				
Sec.												
fLpb	1.000	1.000			1.000		1.000	1.000				
fRpb		1.000			1.000	1.000		1.000				
S	3437	3547			3547	1583	1770	3235				
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	742	3437		0.22	0.31	1058	0.70
Prot								
Perm								
Thru	T	2163	3547	#	0.61	0.59	2094	1.03
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	285	3547		0.08	0.25	873	0.33
Right	R	198	1583		0.13	0.25	390	0.51
Northbound								
Prot								
Perm								
Left	L	420	1770		0.24	0.33	579	0.73
Prot								
Perm								
Thru	LTR	1106	3235	#	0.34	0.33	1058	1.05
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.95
Total lost time per cycle, L = 9.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.04

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.70	0.31	35.1	1.000	1058	0.27	2.1	0.0	37.2	D		
T	1.03	0.59	23.5	1.000	2094	0.50	28.7	0.0	52.3	D	48.4	D
Westbound												
T	0.33	0.25	35.5	1.000	873	0.11	0.2	0.0	35.8	D	36.9	D
R	0.51	0.25	37.3	1.000	390	0.12	1.1	0.0	38.4	D		
Northbound												
L	0.73	0.33	34.1	1.000	579	0.29	4.5	0.0	38.7	D		
LTR	1.05	0.33	38.7	1.000	1058	0.50	40.3	0.0	79.0	E	67.9	E
Southbound												

Intersection delay = 53.3 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 115.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 115.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	115.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	39.8	35.1	0.00	0.0	0.0	37.2

T	0.0	0.00	23.5	23.5	0.00	17.2	0.0	52.3
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	43.3	35.5	0.00	0.0	0.0	35.8
R	0.0	0.00	43.3	37.3	0.00	0.0	0.0	38.4
Northbound								
L	0.0	0.00	38.7	34.1	0.00	0.0	0.0	38.7
LTR	0.0	0.00	38.7	38.7	0.00	12.0	0.0	79.0
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 53.3 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound			Southbound		
LaneGroup	L	T		T	R	L	LTR				
Init Queue	0.0	0.0		0.0	0.0	0.0	0.0				
Flow Rate	382	1136		149	198	420	580				
So	1900	1900		1900	1900	1900	1900				
No.Lanes	2	2	0	0 2	1	1	2	0	0	0	0
SL	1770	1862		1862	1583	1770	1699				
LnCapacity	544	1099		458	390	579	555				
Flow Ratio	0.2	0.6		0.1	0.1	0.2	0.3				
v/c Ratio	0.70	1.03		0.33	0.51	0.73	1.05				
Grn Ratio	0.31	0.59		0.25	0.25	0.33	0.33				
I Factor		1.000		1.000			1.000				
AT or PVG	3	3		3	3	3	3				
Pltn Ratio	1.00	1.00		1.00	1.00	1.00	1.00				
PF2	1.00	1.00		1.00	1.00	1.00	1.00				
Q1	10.8	36.3		3.9	5.4	11.8	18.5				
kB	0.6	0.8		0.5	0.5	0.6	0.6				
Q2	1.2	13.5		0.2	0.5	1.4	8.1				
Q Average	12.0	49.8		4.1	5.9	13.3	26.7				
Q Spacing	25.0	25.0		25.0	25.0	25.0	25.0				
Q Storage	0	0		0	0	0	0				
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.1		1.2	1.2	1.2	1.2				
BOQ	14.1	56.2		4.9	7.0	15.5	30.7				
QSRatio											
85th Percentile Output:											
fB%	1.5	1.4		1.6	1.5	1.5	1.4				
BOQ	18.0	67.6		6.5	9.1	19.8	37.9				
QSRatio											
90th Percentile Output:											
fB%	1.6	1.4		1.7	1.7	1.6	1.5				
BOQ	19.4	71.4		7.1	10.0	21.3	40.1				
QSRatio											
95th Percentile Output:											
fB%	1.8	1.5		2.0	1.9	1.8	1.6				
BOQ	21.7	76.6		8.2	11.4	23.7	43.6				
QSRatio											
98th Percentile Output:											
fB%	2.1	1.7		2.4	2.3	2.1	1.8				
BOQ	25.2	85.7		10.0	13.8	27.3	48.8				
QSRatio											

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 NB Ramps

Inter.: Baker at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
LGConfig	L	T			T	R	L	LTR				
Volume	343	688			1435	673	375	474	502			
Lane Width	12.0	12.0			12.0	12.0	12.0	12.0				
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	9.0	11.4	26.1	0.0		29.8	0.0		
Yellow	3.2	4.0	4.0			3.5			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	326	3437	1.11	0.09	124.9	F		
T	2080	3547	0.35	0.59	10.3	B	48.4	D
Westbound								
T	1587	3547	0.95	0.45	38.3	D	45.2	D
R	708	1583	1.00	0.45	60.1	E		
Northbound								
L	555	1770	0.71	0.31	33.1	C		
LTR	1027	3273	1.00	0.31	60.7	E	53.0	D
Southbound								

Intersection Delay = 48.3 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Baker at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 NB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	343	688			1435	673	375	474	502			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	90	181			378	177	99	125	132			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900	1900	1900				
ParkExist												
NumPark												
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
LGConfig	L	T			T	R	L	LTR				
Lane Width	12.0	12.0			12.0	12.0	12.0	12.0				
RTOR Vol					0			0				
Adj Flow	361	724			1511	708	395	1027				
%InSharedLn							0					
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000			0.000	1.000		0.514				
Peds Bikes					0			0			0	
Buses	0	0			0	0	0	0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0	0.0	0.0				
Arriv. Type	3	3			3	3	3	3				
Unit Ext.	3.0	3.0			3.0	3.0	3.0	3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0	2.0	2.0				
Ext of g	2.0	2.0			2.0	2.0	2.0	2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	9.0	11.4	26.1	0.0		29.8	0.0	
Yellow	3.2	4.0	4.0			3.5		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	343	688			1435	673	375	474	502			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	361	724			1511	708	395	499	528			
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
Lane group	L	T			T	R	L	LTR				
Adj flow	361	724			1511	708	395	1027				
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000			0.000	1.000		0.514				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound		Northbound		Southbound			
LG	L	T			T	R	L	LTR				
So	1900	1900			1900	1900	1900	1900				
Lanes	2	2	0	0	2	1	1	2	0	0	0	0
fW	1.000	1.000			1.000	1.000	1.000	1.000				
fHV	0.980	0.980			0.980	0.980	0.980	0.980				
fG	1.000	1.000			1.000	1.000	1.000	1.000				
fP	1.000	1.000			1.000	1.000	1.000	1.000				
fBB	1.000	1.000			1.000	1.000	1.000	1.000				
fA	1.000	1.000			1.000	1.000	1.000	1.000				
fLU	0.971	0.952			0.952	1.000	1.000	0.952				
fRT		1.000			1.000	0.850		0.923				
fLT	0.950	1.000			1.000		0.950	1.000				
Sec.												
fLpb	1.000	1.000			1.000		1.000	1.000				
fRpb		1.000			1.000	1.000		1.000				
S	3437	3547			3547	1583	1770	3273				
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	361	3437	#	0.11	0.09	326	1.11
Prot								
Perm								
Thru	T	724	3547		0.20	0.59	2080	0.35
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1511	3547		0.43	0.45	1587	0.95
Right	R	708	1583	#	0.45	0.45	708	1.00
Northbound								
Prot								
Perm								
Left	L	395	1770		0.22	0.31	555	0.71
Prot								
Perm								
Thru	LTR	1027	3273	#	0.31	0.31	1027	1.00
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.87
Total lost time per cycle, L = 13.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.01

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.11	0.09	43.0	1.000	326	0.50	81.9	0.0	124.9	F		
T	0.35	0.59	10.2	1.000	2080	0.11	0.1	0.0	10.3	B	48.4	D
Westbound												
T	0.95	0.45	25.3	1.000	1587	0.46	13.0	0.0	38.3	D	45.2	D
R	1.00	0.45	26.3	1.000	708	0.50	33.8	0.0	60.1	E		
Northbound												
L	0.71	0.31	28.8	1.000	555	0.28	4.3	0.0	33.1	C		
LTR	1.00	0.31	32.6	1.000	1027	0.50	28.1	0.0	60.7	E	53.0	D
Southbound												

Intersection delay = 48.3 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	43.0	43.0	0.00	8.7	0.0	124.9

T	0.0	0.00	19.7	10.2	0.00	0.0	0.0	10.3
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	26.3	25.3	0.00	0.0	0.0	38.3
R	0.0	0.00	26.3	26.3	0.00	0.0	0.0	60.1
Northbound								
L	0.0	0.00	32.6	28.8	0.00	0.0	0.0	33.1
LTR	0.0	0.00	32.6	32.6	0.00	0.0	0.0	60.7
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 48.3 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound			Southbound		
LaneGroup	L	T		T	R	L	LTR				
Init Queue	0.0	0.0		0.0	0.0	0.0	0.0				
Flow Rate	185	380		793	708	395	539				
So	1900	1900		1900	1900	1900	1900				
No.Lanes	2	2	0	2	1	1	2	0	0	0	0
SL	1770	1862		1862	1583	1770	1719				
LnCapacity	167	1092		833	708	555	539				
Flow Ratio	0.1	0.2		0.4	0.4	0.2	0.3				
v/c Ratio	1.11	0.35		0.95	1.00	0.71	1.00				
Grn Ratio	0.09	0.59		0.45	0.45	0.31	0.31				
I Factor		1.000		1.000			1.000				
AT or PVG	3	3		3	3	3	3				
Pltn Ratio	1.00	1.00		1.00	1.00	1.00	1.00				
PF2	1.00	1.00		1.00	1.00	1.00	1.00				
Q1	4.9	5.2		20.1	18.7	9.2	14.2				
kB	0.2	0.8		0.6	0.6	0.5	0.5				
Q2	3.8	0.4		5.8	7.2	1.2	5.8				
Q Average	8.6	5.6		26.0	25.8	10.4	20.0				
Q Spacing	25.0	25.0		25.0	25.0	25.0	25.0				
Q Storage	0	0		0	0	0	0				
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2		1.2	1.2	1.2	1.2				
BOQ	10.2	6.7		29.9	29.8	12.2	23.2				
QSRatio											
85th Percentile Output:											
fB%	1.5	1.5		1.4	1.4	1.5	1.5				
BOQ	13.2	8.7		37.1	36.9	15.7	29.1				
QSRatio											
90th Percentile Output:											
fB%	1.7	1.7		1.5	1.5	1.6	1.5				
BOQ	14.3	9.6		39.2	39.0	17.0	30.9				
QSRatio											
95th Percentile Output:											
fB%	1.9	1.9		1.6	1.6	1.8	1.7				
BOQ	16.2	10.9		42.7	42.5	19.1	33.9				
QSRatio											
98th Percentile Output:											
fB%	2.2	2.3		1.8	1.8	2.2	1.9				
BOQ	19.1	13.2		47.7	47.5	22.3	38.3				
QSRatio											

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 SB Ramps

Inter.: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
LGConfig		TR	R	L	T						LT	R
Volume		1964	262	99	495					836	149	215
Lane Width		12.0	12.0	12.0	12.0						12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	6.4	45.0	23.4	0.0		36.9	0.0	
Yellow	3.0	4.0	4.0			3.3		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 130.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	2003	3547	1.03	0.56	57.1	E	52.2	D
R	894	1583	0.31	0.56	15.1	B		
Westbound								
L	87	1770	1.20	0.05	220.1	F		
T	2286	3547	0.23	0.64	9.7	A	44.7	D
Northbound								
Southbound								
LT	966	3402	1.07	0.28	97.3	F	87.0	F
R	449	1583	0.50	0.28	39.8	D		

Intersection Delay = 61.5 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Baker at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 SB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1964	262	99	495					836	149	215
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		517	69	26	130					220	39	57
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900	1900	1900						1900	1900
ParkExist												
NumPark												
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
LGConfig		TR	R	L	T						LT	R
Lane Width		12.0	12.0	12.0	12.0						12.0	12.0
RTOR Vol			0									0
Adj Flow		2067	276	104	521						1037	226
%InSharedLn			0									
Prop LTs		0.000			0.000						0.849	
Prop RTs		0.000	1.000		0.000						0.000	1.000
Peds Bikes	0						0			0		
Buses		0	0	0	0						0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0	0.0	0.0						0.0	0.0
Arriv. Type		3	3	3	3						3	3
Unit Ext.		3.0	3.0	3.0	3.0						3.0	3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0	2.0	2.0						2.0	2.0
Ext of g		2.0	2.0	2.0	2.0						2.0	2.0
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	6.4	45.0	23.4	0.0		36.9	0.0	
Yellow	3.0	4.0	4.0			3.3		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 130.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1964	262	99	495					836	149	215
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		2067	276	104	521					880	157	226
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
Lane group		TR	R	L	T						LT	R
Adj flow		2067	276	104	521						1037	226
Prop LTs		0.000			0.000						0.849	
Prop RTs		0.000	1.000		0.000						0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound					Southbound	
LG	TR	R	L	T						LT	R
So	1900	1900	1900	1900						1900	1900
Lanes 0	2	1	1	2	0	0	0	0	0	2	1
fW	1.000	1.000	1.000	1.000						1.000	1.000
fHV	0.980	0.980	0.980	0.980						0.980	0.980
fG	1.000	1.000	1.000	1.000						1.000	1.000
fP	1.000	1.000	1.000	1.000						1.000	1.000
fBB	1.000	1.000	1.000	1.000						1.000	1.000
fA	1.000	1.000	1.000	1.000						1.000	1.000
fLU	0.952	1.000	1.000	0.952						0.952	1.000
fRT	1.000	0.850		1.000						1.000	0.850
fLT	1.000		0.950	1.000						0.959	
Sec.											
fLpb	1.000		1.000	1.000						1.000	
fRpb	1.000	1.000		1.000						1.000	1.000
S	3547	1583	1770	3547						3402	1583
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	2067	3547	#	0.58	0.56	2003	1.03
Right	R	276	1583		0.17	0.56	894	0.31
Westbound								
Prot								
Perm								
Left	L	104	1770	#	0.06	0.05	87	1.20
Prot								
Perm								
Thru	T	521	3547		0.15	0.64	2286	0.23
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	1037	3402	#	0.30	0.28	966	1.07
Right	R	226	1583		0.14	0.28	449	0.50

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.95
Total lost time per cycle, L = 13.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.05

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	1.03	0.56	28.3	1.000	2003	0.50	28.8	0.0	57.1	E	52.2	D
R	0.31	0.56	14.9	1.000	894	0.11	0.2	0.0	15.1	B		
Westbound												
L	1.20	0.05	61.8	1.000	87	0.50	158.3	0.0	220.1	F		
T	0.23	0.64	9.6	1.000	2286	0.11	0.1	0.0	9.7	A	44.7	D
Northbound												
Southbound												

LT	1.07	0.28	46.5	1.000	966	0.50	50.8	0.0	97.3	F	87.0	F
R	0.50	0.28	38.9	1.000	449	0.11	0.9	0.0	39.8	D		

Intersection delay = 61.5 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 130.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 130.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.849
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	130.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	28.3	28.3	0.00	16.0	0.0	57.1
R	0.0	0.00	28.3	14.9	0.00	0.0	0.0	15.1
Westbound								
L	0.0	0.00	61.8	61.8	0.00	4.2	0.0	220.1
T	0.0	0.00	23.1	9.6	0.00	0.0	0.0	9.7
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LT	0.0	0.00	46.5	46.5	0.00	17.8	0.0	97.3
R	0.0	0.00	46.5	38.9	0.00	0.0	0.0	39.8

Intersection Delay 61.5 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound			Southbound	
LaneGroup	TR	R	L	T					LT	R
Init Queue	0.0	0.0	0.0	0.0					0.0	0.0
Flow Rate	1085	276	104	273					544	226
So	1900	1900	1900	1900					1900	1900
No.Lanes	2	1	1	2	0	0	0	0	2	1
SL	1862	1583	1770	1862					1786	1583
LnCapacity	1051	894	87	1200					507	449
Flow Ratio	0.6	0.2	0.1	0.1					0.3	0.1
v/c Ratio	1.03	0.31	1.20	0.23					1.07	0.50
Grn Ratio	0.56	0.56	0.05	0.64					0.28	0.28
I Factor	1.000			1.000					1.000	
AT or PVG	3	3	3	3					3	3
Pltn Ratio	1.00	1.00	1.00	1.00					1.00	1.00
PF2	1.00	1.00	1.00	1.00					1.00	1.00
Q1	39.2	5.3	3.8	4.1					19.6	6.8
kB	0.9	0.8	0.2	1.0					0.6	0.5
Q2	13.3	0.4	3.0	0.3					9.0	0.5
Q Average	52.5	5.6	6.7	4.4					28.6	7.3
Q Spacing	25.0	25.0	25.0	25.0					25.0	25.0
Q Storage	0	0	0	0					0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.1	1.2	1.2	1.2					1.1	1.2
BOQ	59.1	6.7	8.0	5.2					32.9	8.7
QSRatio										
85th Percentile Output:										
fB%	1.4	1.5	1.5	1.6					1.4	1.5
BOQ	71.0	8.7	10.4	6.8					40.5	11.3
QSRatio										
90th Percentile Output:										
fB%	1.4	1.7	1.7	1.7					1.5	1.7
BOQ	75.0	9.6	11.4	7.6					42.8	12.3
QSRatio										
95th Percentile Output:										
fB%	1.5	1.9	1.9	2.0					1.6	1.9
BOQ	80.4	10.9	12.9	8.6					46.4	14.0
QSRatio										
98th Percentile Output:										
fB%	1.7	2.3	2.3	2.4					1.8	2.3
BOQ	90.1	13.2	15.5	10.6					51.8	16.7
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 SB Ramps

Inter.: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
LGConfig		TR	R	L	T						LT	R
Volume		821	551	357	1412					279	383	518
Lane Width		12.0	12.0	12.0	12.0						12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	18.4	17.8	10.4	0.0	30.1	0.0		
Yellow	3.0	4.0	4.0		3.3			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	1240	3547	0.70	0.35	28.3	C	50.1	D
R	553	1583	1.05	0.35	82.6	F		
Westbound								
L	343	1770	1.10	0.19	115.2	F		
T	2076	3547	0.72	0.59	15.3	B	35.5	D
Northbound								
Southbound								
LT	1100	3473	0.63	0.32	28.9	C	59.2	E
R	502	1583	1.09	0.32	97.8	F		

Intersection Delay = 46.6 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Baker at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 SB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		821	551	357	1412					279	383	518
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		216	145	94	372					73	101	136
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900	1900	1900						1900	1900
ParkExist												
NumPark												
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
LGConfig		TR	R	L	T						LT	R
Lane Width		12.0	12.0	12.0	12.0						12.0	12.0
RTOR Vol			0									0
Adj Flow		864	580	376	1486						697	545
%InSharedLn			0									
Prop LTs		0.000			0.000						0.422	
Prop RTs		0.000	1.000		0.000						0.000	1.000
Peds Bikes	0						0			0		
Buses		0	0	0	0						0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0	0.0	0.0						0.0	0.0
Arriv. Type		3	3	3	3						3	3
Unit Ext.		3.0	3.0	3.0	3.0						3.0	3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0	2.0	2.0						2.0	2.0
Ext of g		2.0	2.0	2.0	2.0						2.0	2.0
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	18.4	17.8	10.4	0.0		30.1	0.0	
Yellow	3.0	4.0	4.0			3.3		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		821	551	357	1412					279	383	518
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		864	580	376	1486					294	403	545
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
Lane group		TR	R	L	T						LT	R
Adj flow		864	580	376	1486						697	545
Prop LTs		0.000			0.000						0.422	
Prop RTs		0.000	1.000		0.000						0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound					Southbound	
LG	TR	R	L	T						LT	R
So	1900	1900	1900	1900						1900	1900
Lanes 0	2	1	1	2	0	0	0	0	0	2	1
fW	1.000	1.000	1.000	1.000						1.000	1.000
fHV	0.980	0.980	0.980	0.980						0.980	0.980
fG	1.000	1.000	1.000	1.000						1.000	1.000
fP	1.000	1.000	1.000	1.000						1.000	1.000
fBB	1.000	1.000	1.000	1.000						1.000	1.000
fA	1.000	1.000	1.000	1.000						1.000	1.000
fLU	0.952	1.000	1.000	0.952						0.952	1.000
fRT	1.000	0.850		1.000						1.000	0.850
fLT	1.000		0.950	1.000						0.979	
Sec.											
fLpb	1.000		1.000	1.000						1.000	
fRpb	1.000	1.000		1.000						1.000	1.000
S	3547	1583	1770	3547						3473	1583
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	864	3547		0.24	0.35	1240	0.70
Right	R	580	1583	#	0.37	0.35	553	1.05
Westbound								
Prot								
Perm								
Left	L	376	1770	#	0.21	0.19	343	1.10
Prot								
Perm								
Thru	T	1486	3547		0.42	0.59	2076	0.72
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	697	3473		0.20	0.32	1100	0.63
Right	R	545	1583	#	0.34	0.32	502	1.09

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.92
Total lost time per cycle, L = 13.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.07

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	0.70	0.35	26.6	1.000	1240	0.26	1.7	0.0	28.3	C	50.1	D
R	1.05	0.35	30.9	1.000	553	0.50	51.7	0.0	82.6	F		
Westbound												
L	1.10	0.19	38.3	1.000	343	0.50	76.9	0.0	115.2	F		
T	0.72	0.59	14.1	1.000	2076	0.28	1.2	0.0	15.3	B	35.5	D
Northbound												
Southbound												

LT	0.63	0.32	27.7	1.000	1100	0.21	1.2	0.0	28.9	C	59.2	E
R	1.09	0.32	32.4	1.000	502	0.50	65.4	0.0	97.8	F		

Intersection delay = 46.6 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.422
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	30.9	26.6	0.00	0.0	0.0	28.3
R	0.0	0.00	30.9	30.9	0.00	6.7	0.0	82.6
Westbound								
L	0.0	0.00	38.3	38.3	0.00	8.2	0.0	115.2
T	0.0	0.00	19.7	14.1	0.00	0.0	0.0	15.3
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LT	0.0	0.00	32.4	27.7	0.00	0.0	0.0	28.9
R	0.0	0.00	32.4	32.4	0.00	10.7	0.0	97.8

Intersection Delay 46.6 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound			Southbound	
LaneGroup	TR	R	L	T					LT	R
Init Queue	0.0	0.0	0.0	0.0					0.0	0.0
Flow Rate	453	580	376	780					366	545
So	1900	1900	1900	1900					1900	1900
No.Lanes	0 2	1	1	2	0	0	0	0	2	1
SL	1862	1583	1770	1862					1824	1583
LnCapacity	651	553	343	1090					577	502
Flow Ratio	0.2	0.4	0.2	0.4					0.2	0.3
v/c Ratio	0.70	1.05	1.10	0.72					0.63	1.09
Grn Ratio	0.35	0.35	0.19	0.59					0.32	0.32
I Factor	1.000			1.000					1.000	
AT or PVG	3	3	3	3					3	3
Pltn Ratio	1.00	1.00	1.00	1.00					1.00	1.00
PF2	1.00	1.00	1.00	1.00					1.00	1.00
Q1	10.3	15.3	9.9	14.7					8.3	14.4
kB	0.6	0.5	0.4	0.8					0.5	0.5
Q2	1.2	7.9	6.7	1.8					0.9	9.0
Q Average	11.5	23.2	16.7	16.5					9.1	23.3
Q Spacing	25.0	25.0	25.0	25.0					25.0	25.0
Q Storage	0	0	0	0					0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2	1.2	1.2					1.2	1.2
BOQ	13.5	26.9	19.4	19.2					10.8	27.0
QSRatio										
85th Percentile Output:										
fB%	1.5	1.4	1.5	1.5					1.5	1.4
BOQ	17.3	33.4	24.5	24.3					13.9	33.6
QSRatio										
90th Percentile Output:										
fB%	1.6	1.5	1.6	1.6					1.7	1.5
BOQ	18.7	35.4	26.2	26.0					15.1	35.6
QSRatio										
95th Percentile Output:										
fB%	1.8	1.7	1.7	1.7					1.9	1.7
BOQ	20.9	38.7	29.0	28.7					17.0	38.8
QSRatio										
98th Percentile Output:										
fB%	2.1	1.9	2.0	2.0					2.2	1.9
BOQ	24.3	43.4	32.9	32.7					20.0	43.6
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 NB Ramps
Inter.: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
LGConfig	L	T			T	R		LT	R			
Volume	266	1638			232	256	128	769	292			
Lane Width	12.0	12.0			12.0	12.0		12.0	12.0			
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	13.9	5.9	6.3	0.0		19.7	0.0		
Yellow	3.6	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	379	1770	0.74	0.21	31.3	C		
T	1948	3547	0.89	0.55	18.1	B	20.0-	B
Westbound								
T	939	3547	0.26	0.26	19.0	B	21.9	C
R	419	1583	0.64	0.26	24.5	C		
Northbound								
LT	1067	3521	0.88	0.30	30.6	C	28.6	C
R	480	1583	0.64	0.30	22.4	C		
Southbound								

Intersection Delay = 23.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Paularino at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 NB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	266	1638			232	256	128	769	292			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	70	431			61	67	34	202	77			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900		1900	1900			
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
LGConfig	L	T			T	R		LT	R			
Lane Width	12.0	12.0			12.0	12.0		12.0	12.0			
RTOR Vol					0				0			
Adj Flow	280	1724			244	269		944	307			
%InSharedLn												
Prop LTs		0.000			0.000			0.143				
Prop RTs		0.000			0.000	1.000		0.000	1.000			
Peds Bikes					0			0			0	
Buses	0	0			0	0		0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0		0.0	0.0			
Arriv. Type	3	3			3	3		3	3			
Unit Ext.	3.0	3.0			3.0	3.0		3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0		2.0	2.0			
Ext of g	2.0	2.0			2.0	2.0		2.0	2.0			
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	13.9	5.9	6.3	0.0		19.7	0.0	
Yellow	3.6	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	266	1638			232	256	128	769	292			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	280	1724			244	269	135	809	307			
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
Lane group	L	T			T	R		LT	R			
Adj flow	280	1724			244	269		944	307			
Prop LTs		0.000			0.000			0.143				
Prop RTs		0.000			0.000	1.000		0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound			Northbound			Southbound		
LG	L	T			T	R		LT	R				
So	1900	1900			1900	1900		1900	1900				
Lanes	1	2	0	0	2	1	0	2	1	0	0	0	
fW	1.000	1.000			1.000	1.000		1.000	1.000				
fHV	0.980	0.980			0.980	0.980		0.980	0.980				
fG	1.000	1.000			1.000	1.000		1.000	1.000				
fP	1.000	1.000			1.000	1.000		1.000	1.000				
fBB	1.000	1.000			1.000	1.000		1.000	1.000				
fA	1.000	1.000			1.000	1.000		1.000	1.000				
fLU	1.000	0.952			0.952	1.000		0.952	1.000				
fRT		1.000			1.000	0.850		1.000	0.850				
fLT	0.950	1.000			1.000			0.993					
Sec.													
fLpb	1.000	1.000			1.000			1.000					
fRpb		1.000			1.000	1.000		1.000	1.000				
S	1770	3547			3547	1583		3521	1583				
Sec.													

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	280	1770		0.16	0.21	379	0.74
Prot								
Perm								
Thru	T	1724	3547	#	0.49	0.55	1948	0.89
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	244	3547		0.07	0.26	939	0.26
Right	R	269	1583		0.17	0.26	419	0.64
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	944	3521	#	0.27	0.30	1067	0.88
Right	R	307	1583		0.19	0.30	480	0.64
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.75
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.88

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.74	0.21	23.9	1.000	379	0.30	7.5	0.0	31.3	C		
T	0.89	0.55	12.8	1.000	1948	0.41	5.3	0.0	18.1	B	20.0-	B
Westbound												
T	0.26	0.26	18.9	1.000	939	0.11	0.1	0.0	19.0	B	21.9	C
R	0.64	0.26	21.2	1.000	419	0.22	3.3	0.0	24.5	C		
Northbound												
LT	0.88	0.30	21.6	1.000	1067	0.41	9.0	0.0	30.6	C	28.6	C
R	0.64	0.30	19.6	1.000	480	0.22	2.9	0.0	22.4	C		
Southbound												

Intersection delay = 23.1 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.143	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	25.6	23.9	0.00	0.0	0.0	31.3

T	0.0	0.00	14.7	12.8	0.00	0.0	0.0	18.1
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	23.9	18.9	0.00	0.0	0.0	19.0
R	0.0	0.00	23.9	21.2	0.00	0.0	0.0	24.5
Northbound								
	0.0						0.0	
LT	0.0	0.00	22.6	21.6	0.00	0.0	0.0	30.6
R	0.0	0.00	22.6	19.6	0.00	0.0	0.0	22.4
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 23.1 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup	L	T		T	R	LT	R			
Init Queue	0.0	0.0		0.0	0.0	0.0	0.0			
Flow Rate	280	905		128	269	495	307			
So	1900	1900		1900	1900	1900	1900			
No.Lanes	1	2	0	0	2	1	0	2	1	0	0	0
SL	1770	1862		1862	1583	1849	1583			
LnCapacity	379	1023		493	419	560	480			
Flow Ratio	0.2	0.5		0.1	0.2	0.3	0.2			
v/c Ratio	0.74	0.88		0.26	0.64	0.88	0.64			
Grn Ratio	0.21	0.55		0.26	0.26	0.30	0.30			
I Factor		1.000		1.000		1.000				
AT or PVG	3	3		3	3	3	3			
Pltn Ratio	1.00	1.00		1.00	1.00	1.00	1.00			
PF2	1.00	1.00		1.00	1.00	1.00	1.00			
Q1	4.7	14.3		1.8	4.3	8.5	4.8			
kB	0.3	0.6		0.4	0.3	0.4	0.4			
Q2	0.8	3.6		0.1	0.6	2.4	0.6			
Q Average	5.6	17.9		2.0	4.9	10.9	5.4			
Q Spacing	25.0	25.0		25.0	25.0	25.0	25.0			
Q Storage	0	0		0	0	0	0			
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2		1.2	1.2	1.2	1.2			
BOQ	6.6	20.8		2.3	5.8	12.8	6.4			
QSRatio										
85th Percentile Output:										
fB%	1.5	1.5		1.6	1.6	1.5	1.6			
BOQ	8.6	26.2		3.1	7.6	16.4	8.4			
QSRatio										
90th Percentile Output:										
fB%	1.7	1.6		1.8	1.7	1.6	1.7			
BOQ	9.5	28.0		3.4	8.4	17.7	9.2			
QSRatio										
95th Percentile Output:										
fB%	1.9	1.7		2.0	2.0	1.8	1.9			
BOQ	10.8	30.8		4.0	9.6	19.9	10.5			
QSRatio										
98th Percentile Output:										
fB%	2.4	2.0		2.6	2.4	2.1	2.4			
BOQ	13.1	34.9		5.0	11.7	23.2	12.8			
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 NB Ramps

Inter.: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
LGConfig	L	T			T	R		LT	R			
Volume	166	579			992	633	171	936	224			
Lane Width	12.0	12.0			12.0	12.0		12.0	12.0			
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	8.5	11.8	23.4	0.0		32.1	0.0		
Yellow	3.6	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	158	1770	1.11	0.09	146.6	F		
T	1990	3547	0.31	0.56	11.1	B	41.4	D
Westbound								
T	1501	3547	0.70	0.42	23.8	C	38.1	D
R	670	1583	0.99	0.42	60.5	E		
Northbound								
LT	1189	3519	0.98	0.34	52.4	D	47.8	D
R	535	1583	0.44	0.34	25.1	C		
Southbound								

Intersection Delay = 42.2 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Paularino at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 NB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	166	579			992	633	171	936	224			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	44	152			261	167	45	246	59			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900		1900	1900			
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
LGConfig	L	T			T	R		LT	R			
Lane Width	12.0	12.0			12.0	12.0		12.0	12.0			
RTOR Vol					0			0				
Adj Flow	175	609			1044	666		1165	236			
%InSharedLn												
Prop LTs		0.000			0.000			0.155				
Prop RTs		0.000			0.000	1.000		0.000	1.000			
Peds Bikes					0			0			0	
Buses	0	0			0	0		0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0		0.0	0.0			
Arriv. Type	3	3			3	3		3	3			
Unit Ext.	3.0	3.0			3.0	3.0		3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0		2.0	2.0			
Ext of g	2.0	2.0			2.0	2.0		2.0	2.0			
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	8.5	11.8	23.4	0.0		32.1	0.0	
Yellow	3.6	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	166	579			992	633	171	936	224			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	175	609			1044	666	180	985	236			
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
Lane group	L	T			T	R		LT	R			
Adj flow	175	609			1044	666		1165	236			
Prop LTs		0.000			0.000			0.155				
Prop RTs		0.000			0.000	1.000		0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound			Northbound			Southbound		
LG	L	T			T	R		LT	R				
So	1900	1900			1900	1900		1900	1900				
Lanes	1	2	0	0	2	1	0	2	1	0	0	0	
fW	1.000	1.000			1.000	1.000		1.000	1.000				
fHV	0.980	0.980			0.980	0.980		0.980	0.980				
fG	1.000	1.000			1.000	1.000		1.000	1.000				
fP	1.000	1.000			1.000	1.000		1.000	1.000				
fBB	1.000	1.000			1.000	1.000		1.000	1.000				
fA	1.000	1.000			1.000	1.000		1.000	1.000				
fLU	1.000	0.952			0.952	1.000		0.952	1.000				
fRT		1.000			1.000	0.850		1.000	0.850				
fLT	0.950	1.000			1.000			0.992					
Sec.													
fLpb	1.000	1.000			1.000			1.000					
fRpb		1.000			1.000	1.000		1.000	1.000				
S	1770	3547			3547	1583		3519	1583				
Sec.													

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	175	1770	#	0.10	0.09	158	1.11
Prot								
Perm								
Thru	T	609	3547		0.17	0.56	1990	0.31
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1044	3547		0.29	0.42	1501	0.70
Right	R	666	1583	#	0.42	0.42	670	0.99
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	1165	3519	#	0.33	0.34	1189	0.98
Right	R	236	1583		0.15	0.34	535	0.44
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.85
Total lost time per cycle, L = 14.20 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.00

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.11	0.09	43.3	1.000	158	0.50	103.4	0.0	146.6	F		
T	0.31	0.56	11.0	1.000	1990	0.11	0.1	0.0	11.1	B	41.4	D
Westbound												
T	0.70	0.42	22.4	1.000	1501	0.26	1.4	0.0	23.8	C	38.1	D
R	0.99	0.42	27.3	1.000	670	0.50	33.2	0.0	60.5	E		
Northbound												
LT	0.98	0.34	31.1	1.000	1189	0.48	21.3	0.0	52.4	D	47.8	D
R	0.44	0.34	24.5	1.000	535	0.11	0.6	0.0	25.1	C		
Southbound												

Intersection delay = 42.2 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.155	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	43.3	43.3	0.00	4.3	0.0	146.6

T	0.0	0.00	20.8	11.0	0.00	0.0	0.0	11.1
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	27.4	22.4	0.00	0.0	0.0	23.8
R	0.0	0.00	27.4	27.3	0.00	0.0	0.0	60.5
Northbound								
	0.0						0.0	
LT	0.0	0.00	31.5	31.1	0.00	0.0	0.0	52.4
R	0.0	0.00	31.5	24.5	0.00	0.0	0.0	25.1
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 42.2 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup	L	T		T	R	LT	R			
Init Queue	0.0	0.0		0.0	0.0	0.0	0.0			
Flow Rate	175	319		548	666	611	236			
So	1900	1900		1900	1900	1900	1900			
No.Lanes	1	2	0	0 2	1	0 2	1	0 0	0	
SL	1770	1862		1862	1583	1848	1583			
LnCapacity	158	1045		788	670	624	535			
Flow Ratio	0.1	0.2		0.3	0.4	0.3	0.1			
v/c Ratio	1.11	0.31		0.70	0.99	0.98	0.44			
Grn Ratio	0.09	0.56		0.42	0.42	0.34	0.34			
I Factor		1.000		1.000		1.000				
AT or PVG	3	3		3	3	3	3			
Pltn Ratio	1.00	1.00		1.00	1.00	1.00	1.00			
PF2	1.00	1.00		1.00	1.00	1.00	1.00			
Q1	4.6	4.5		11.8	17.5	16.0	4.8			
kB	0.2	0.7		0.6	0.6	0.5	0.5			
Q2	3.6	0.3		1.3	6.6	5.6	0.4			
Q Average	8.2	4.8		13.2	24.1	21.6	5.2			
Q Spacing	25.0	25.0		25.0	25.0	25.0	25.0			
Q Storage	0	0		0	0	0	0			
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2		1.2	1.2	1.2	1.2			
BOQ	9.7	5.7		15.4	27.8	25.0	6.2			
QSRatio										
85th Percentile Output:										
fB%	1.5	1.6		1.5	1.4	1.4	1.6			
BOQ	12.5	7.4		19.7	34.5	31.2	8.1			
QSRatio										
90th Percentile Output:										
fB%	1.7	1.7		1.6	1.5	1.5	1.7			
BOQ	13.6	8.2		21.2	36.6	33.2	8.9			
QSRatio										
95th Percentile Output:										
fB%	1.9	2.0		1.8	1.7	1.7	1.9			
BOQ	15.4	9.4		23.6	39.9	36.3	10.2			
QSRatio										
98th Percentile Output:										
fB%	2.2	2.4		2.1	1.9	1.9	2.4			
BOQ	18.3	11.4		27.2	44.7	40.8	12.4			
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 SB Ramps

Inter.: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
LGConfig		TR		L	T						LT	R
Volume		1122	172	118	233					788	970	197
Lane Width		12.0		12.0	12.0						12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	5.5	12.8	26.5	0.0		61.4	0.0	
Yellow	3.2	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 125.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	1232	3476	1.11	0.35	100.0	F	100.0	F
Westbound								
L	78	1770	1.59	0.04	377.1	F		
T	1532	3547	0.16	0.43	21.7	C	141.2	F
Northbound								
Southbound								
LT	1704	3469	1.09	0.49	80.9	F	74.6	E
R	778	1583	0.27	0.49	18.8	B		

Intersection Delay = 90.2 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 SB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1122	172	118	233					788	970	197
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		295	45	31	61					207	255	52
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900		1900	1900						1900	1900
ParkExist												
NumPark												
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
LGConfig		TR		L	T						LT	R
Lane Width		12.0		12.0	12.0						12.0	12.0
RTOR Vol			0									0
Adj Flow		1362		124	245						1850	207
%InSharedLn												
Prop LTs		0.000			0.000						0.448	
Prop RTs		0.133			0.000						0.000	1.000
Peds Bikes		0						0			0	
Buses		0		0	0						0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0						0.0	0.0
Arriv. Type		3		3	3						3	3
Unit Ext.		3.0		3.0	3.0						3.0	3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0		2.0	2.0						2.0	2.0
Ext of g		2.0		2.0	2.0						2.0	2.0
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left		A			SB Left	A		
Thru		A	A	A	Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		5.5	12.8	26.5	0.0	61.4	0.0	
Yellow		3.2	4.0	4.0		3.6		
All Red		1.0	1.0	1.0		1.0		

Cycle Length: 125.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1122	172	118	233					788	970	197
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		1181	181	124	245					829	1021	207
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
Lane group		TR		L	T						LT	R
Adj flow		1362		124	245						1850	207
Prop LTs		0.000			0.000						0.448	
Prop RTs		0.133			0.000						0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound				Southbound	
LG	TR		L	T					LT	R
So	1900		1900	1900					1900	1900
Lanes	0 2	0	1	2	0 0	0	0	0	2	1
fW	1.000		1.000	1.000					1.000	1.000
fHV	0.980		0.980	0.980					0.980	0.980
fG	1.000		1.000	1.000					1.000	1.000
fP	1.000		1.000	1.000					1.000	1.000
fBB	1.000		1.000	1.000					1.000	1.000
fA	1.000		1.000	1.000					1.000	1.000
fLU	0.952		1.000	0.952					0.952	1.000
fRT	0.980			1.000					1.000	0.850
fLT	1.000		0.950	1.000					0.978	
Sec.										
fLpb	1.000		1.000	1.000					1.000	
fRpb	1.000			1.000					1.000	1.000
S	3476		1770	3547					3469	1583
Sec.										

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	TR	1362	3476	# 0.39	0.35	1232	1.11
Right							
Westbound							
Prot							
Perm							
Left	L	124	1770	# 0.07	0.04	78	1.59
Prot							
Perm							
Thru	T	245	3547	0.07	0.43	1532	0.16
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LT	1850	3469	# 0.53	0.49	1704	1.09
Right	R	207	1583	0.13	0.49	778	0.27

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.00
Total lost time per cycle, L = 13.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.12

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	1.11	0.35	40.4	1.000	1232	0.50	59.7	0.0	100.0	F	100.0	F
Westbound												
L	1.59	0.04	59.8	1.000	78	0.50	317.4	0.0	377.1	F		
T	0.16	0.43	21.7	1.000	1532	0.11	0.0	0.0	21.7	C	141.2	F
Northbound												
Southbound												

LT	1.09	0.49	31.8	1.000	1704	0.50	49.1	0.0	80.9	F	74.6 E
R	0.27	0.49	18.6	1.000	778	0.11	0.2	0.0	18.8	B	

Intersection delay = 90.2 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.448
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	125.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	40.4	40.4	0.00	32.5	0.0	100.0
	0.0						0.0	
Westbound								
L	0.0	0.00	59.8	59.8	0.00	11.5	0.0	377.1
T	0.0	0.00	35.5	21.7	0.00	0.0	0.0	21.7
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LT	0.0	0.00	31.8	31.8	0.00	36.5	0.0	80.9
R	0.0	0.00	31.8	18.6	0.00	0.0	0.0	18.8

Intersection Delay 90.2 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup	TR	L T		LT R
Init Queue	0.0	0.0 0.0		0.0 0.0
Flow Rate	715	124 128		971 207
So	1900	1900 1900		1900 1900
No.Lanes	0 2 0	1 2 0	0 0 0	0 2 1
SL	1825	1770 1862		1821 1583
LnCapacity	647	78 804		894 778
Flow Ratio	0.4	0.1 0.1		0.5 0.1
v/c Ratio	1.11	1.59 0.16		1.09 0.27
Grn Ratio	0.35	0.04 0.43		0.49 0.49
I Factor	1.000	1.000		1.000
AT or PVG	3	3 3		3 3
Pltn Ratio	1.00	1.00 1.00		1.00 1.00
PF2	1.00	1.00 1.00		1.00 1.00
Q1	24.8	4.3 2.7		33.7 4.2
kB	0.6	0.2 0.7		0.8 0.7
Q2	13.0	6.2 0.1		15.7 0.3
Q Average	37.8	10.5 2.9		49.4 4.5
Q Spacing	25.0	25.0 25.0		25.0 25.0
Q Storage	0	0 0		0 0
Q S Ratio				
70th Percentile Output:				
fB%	1.1	1.2 1.2		1.1 1.2
BOQ	43.0	12.4 3.4		55.8 5.3
QSRatio				
85th Percentile Output:				
fB%	1.4	1.5 1.6		1.4 1.6
BOQ	52.3	15.9 4.5		67.1 7.0
QSRatio				
90th Percentile Output:				
fB%	1.5	1.6 1.7		1.4 1.7
BOQ	55.2	17.2 5.0		70.9 7.7
QSRatio				
95th Percentile Output:				
fB%	1.6	1.8 2.0		1.5 2.0
BOQ	59.5	19.3 5.7		76.0 8.8
QSRatio				
98th Percentile Output:				
fB%	1.8	2.1 2.5		1.7 2.4
BOQ	66.3	22.5 7.1		85.1 10.8
QSRatio				

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 SB Ramps
Inter.: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
LGConfig		TR		L	T						LT	R
Volume		526	108	306	860					174	725	300
Lane Width		12.0		12.0	12.0						12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
WB Left	A				SB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	14.7	5.3	5.1	0.0		21.1	0.0		
Yellow	3.2	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	819	3456	0.82	0.24	29.9	C	29.9	C
Westbound								
L	400	1770	0.81	0.23	35.2	D		
T	1872	3547	0.48	0.53	9.9	A	16.6	B
Northbound								
Southbound								
LT	1140	3513	0.83	0.32	25.6	C	24.4	C
R	514	1583	0.61	0.32	20.7	C		

Intersection Delay = 22.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 SB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		526	108	306	860					174	725	300
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		138	28	81	226					46	191	79
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900		1900	1900						1900	1900
ParkExist												
NumPark												
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
LGConfig		TR		L	T						LT	R
Lane Width		12.0		12.0	12.0						12.0	12.0
RTOR Vol			0									0
Adj Flow		668		322	905						946	316
%InSharedLn												
Prop LTs		0.000			0.000						0.193	
Prop RTs		0.171			0.000						0.000	1.000
Peds Bikes		0						0			0	
Buses		0		0	0						0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0						0.0	0.0
Arriv. Type		3		3	3						3	3
Unit Ext.		3.0		3.0	3.0						3.0	3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0		2.0	2.0						2.0	2.0
Ext of g		2.0		2.0	2.0						2.0	2.0
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left								
Thru		A	A					
Right		A	A					
Peds								
WB Left	A							
Thru	A	A	A					
Right								
Peds								
NB Left								
Thru								
Right								
Peds								
SB Left	A							
Thru	A							
Right	A							
Peds								
NB Right					EB Right			
SB Right					WB Right			
Green	14.7	5.3	5.1	0.0	21.1	0.0		
Yellow	3.2	4.0	4.0		3.6			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		526	108	306	860					174	725	300
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		554	114	322	905					183	763	316
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
Lane group		TR		L	T						LT	R
Adj flow		668		322	905						946	316
Prop LTs		0.000			0.000						0.193	
Prop RTs		0.171			0.000						0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound				Southbound	
LG	TR		L	T					LT	R
So	1900		1900	1900					1900	1900
Lanes	0 2	0	1	2	0 0	0	0	0	2	1
fW	1.000		1.000	1.000					1.000	1.000
fHV	0.980		0.980	0.980					0.980	0.980
fG	1.000		1.000	1.000					1.000	1.000
fP	1.000		1.000	1.000					1.000	1.000
fBB	1.000		1.000	1.000					1.000	1.000
fA	1.000		1.000	1.000					1.000	1.000
fLU	0.952		1.000	0.952					0.952	1.000
fRT	0.974			1.000					1.000	0.850
fLT	1.000		0.950	1.000					0.990	
Sec.										
fLpb	1.000		1.000	1.000					1.000	
fRpb	1.000			1.000					1.000	1.000
S	3456		1770	3547					3513	1583
Sec.										

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	668	3456	#	0.19	0.24	819	0.82
Right								
Westbound								
Prot								
Perm								
Left	L	322	1770	#	0.18	0.23	400	0.81
Prot								
Perm								
Thru	T	905	3547		0.26	0.53	1872	0.48
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	946	3513	#	0.27	0.32	1140	0.83
Right	R	316	1583		0.20	0.32	514	0.61

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.64
Total lost time per cycle, L = 13.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.82

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	0.82	0.24	23.5	1.000	819	0.36	6.4	0.0	29.9	C	29.9	C
Westbound												
L	0.81	0.23	23.8	1.000	400	0.35	11.4	0.0	35.2	D		
T	0.48	0.53	9.7	1.000	1872	0.11	0.2	0.0	9.9	A	16.6	B
Northbound												
Southbound												

LT	0.83	0.32	20.3	1.000	1140	0.37	5.3	0.0	25.6	C	24.4 C
R	0.61	0.32	18.5	1.000	514	0.20	2.2	0.0	20.7	C	

Intersection delay = 22.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.193
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	24.8	23.5	0.00	0.0	0.0	29.9
	0.0						0.0	
Westbound								
L	0.0	0.00	25.1	23.8	0.00	0.0	0.0	35.2
T	0.0	0.00	15.3	9.7	0.00	0.0	0.0	9.9
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LT	0.0	0.00	22.0	20.3	0.00	0.0	0.0	25.6
R	0.0	0.00	22.0	18.5	0.00	0.0	0.0	20.7

Intersection Delay 22.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	TR			L	T					LT	R	
Init Queue	0.0			0.0	0.0					0.0	0.0	
Flow Rate	350			322	475					496	316	
So	1900			1900	1900					1900	1900	
No.Lanes	0	2	0	1	2	0	0	0	0	2	1	
SL	1815			1770	1862					1845	1583	
LnCapacity	430			400	983					598	514	
Flow Ratio	0.2			0.2	0.3					0.3	0.2	
v/c Ratio	0.81			0.81	0.48					0.83	0.61	
Grn Ratio	0.24			0.23	0.53					0.32	0.32	
I Factor	1.000				1.000					1.000		
AT or PVG	3			3	3					3	3	
Pltn Ratio	1.00			1.00	1.00					1.00	1.00	
PF2	1.00			1.00	1.00					1.00	1.00	
Q1	6.0			5.5	5.4					8.3	4.8	
kB	0.3			0.3	0.6					0.4	0.4	
Q2	1.3			1.2	0.5					1.8	0.6	
Q Average	7.3			6.7	6.0					10.1	5.4	
Q Spacing	25.0			25.0	25.0					25.0	25.0	
Q Storage	0			0	0					0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2			1.2	1.2					1.2	1.2	
BOQ	8.6			7.9	7.1					11.8	6.4	
QSRatio												
85th Percentile Output:												
fB%	1.5			1.5	1.5					1.5	1.6	
BOQ	11.2			10.3	9.2					15.2	8.4	
QSRatio												
90th Percentile Output:												
fB%	1.7			1.7	1.7					1.6	1.7	
BOQ	12.2			11.3	10.1					16.5	9.2	
QSRatio												
95th Percentile Output:												
fB%	1.9			1.9	1.9					1.8	1.9	
BOQ	13.9			12.8	11.5					18.5	10.5	
QSRatio												
98th Percentile Output:												
fB%	2.3			2.3	2.3					2.2	2.4	
BOQ	16.6			15.4	13.9					21.7	12.8	
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 NB Ramps

Inter.: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Volume		1660	650		755	300	1075		710			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left A			
Thru	A				Thru			
Right	A	A			Right A			
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right A			
SB Right					WB Right A			
Green	54.9	4.5	0.0		55.0	0.0		
Yellow	4.5	4.5			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 130.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1498	3547	1.17	0.42	120.0	F	86.3	F
R	1583	1583	0.43	1.00	0.2	A		
Westbound								
T	2533	5074	0.31	0.50	19.4	B	13.9	B
R	1583	1583	0.20	1.00	0.1	A		
Northbound								
L	1454	3437	0.78	0.42	35.0+	D		
							21.2	C
R	1583	1583	0.47	1.00	0.2	A		
Southbound								

Intersection Delay = 48.9 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1660	650		755	300	1075		710			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		437	171		199	79	283		187			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900		1900			
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			
Adj Flow		1747	684		795	316	1132		747			
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0	0	0		0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0		0.0			
Arriv. Type		3	3		3	3	3		3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0		3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0		2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0		2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru		A			Thru			
Right		A	A		Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right		A	A		EB Right	A		
SB Right					WB Right	A		
Green		54.9	4.5	0.0		55.0	0.0	
Yellow		4.5	4.5			3.6		
All Red		1.0	1.0			1.0		

Cycle Length: 130.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1660	650		755	300	1075		710			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		1747	684		795	316	1132		747			
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
Lane group		T	R		T	R	L		R			
Adj flow		1747	684		795	316	1132		747			
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R		L	R				
So	1900	1900		1900	1900		1900	1900				
Lanes	0 2	1	0	3	1	0	2	1	0	0	0	
fW	1.000	1.000		1.000	1.000		1.000	1.000				
fHV	0.980	0.980		0.980	0.980		0.980	0.980				
fG	1.000	1.000		1.000	1.000		1.000	1.000				
fP	1.000	1.000		1.000	1.000		1.000	1.000				
fBB	1.000	1.000		1.000	1.000		1.000	1.000				
fA	1.000	1.000		1.000	1.000		1.000	1.000				
fLU	0.952	1.000		0.908	1.000		0.971	1.000				
fRT	1.000	0.850		1.000	0.850			0.850				
fLT	1.000			1.000			0.950					
Sec.												
fLpb	1.000			1.000			1.000					
fRpb	1.000	1.000		1.000	1.000			1.000				
S	3547	1583		5074	1583		3437	1583				
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group		Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru	T		1747	3547		0.49	0.42	1498	1.17
Right	R		684	1583		0.43	1.00	1583	0.43
Westbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru	T		795	5074	#	0.16	0.50	2533	0.31
Right	R		316	1583		0.20	1.00	1583	0.20
Northbound									
Prot									
Perm									
Left	L		1132	3437	#	0.33	0.42	1454	0.78
Prot									
Perm									
Thru									
Right	R		747	1583		0.47	1.00	1583	0.47
Southbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru									
Right									

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.49
Total lost time per cycle, L = 10.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.53

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	1.17	0.42	37.5	1.000	1498	0.50	82.4	0.0	120.0	F	86.3	F
R	0.43	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Westbound												
T	0.31	0.50	19.3	1.000	2533	0.11	0.1	0.0	19.4	B	13.9	B
R	0.20	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Northbound												
L	0.78	0.42	32.3	1.000	1454	0.33	2.8	0.0	35.0+	D		
											21.2	C
R	0.47	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

Intersection delay = 48.9 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 130.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 130.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	130.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	37.5	37.5	0.00	62.2	0.0	120.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
	0.0						0.0	
T	0.0	0.00	32.5	19.3	0.00	0.0	0.0	19.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Northbound								
L	0.0	0.00	37.5	32.3	0.00	0.0	0.0	35.0+
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 48.9 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound				Southbound			
LaneGroup	T	R	T	R	L			R				
Init Queue	0.0	0.0	0.0	0.0	0.0			0.0				
Flow Rate	917	684	291	316	582			747				
So	1900	1900	1900	1900	1900			1900				
No.Lanes	0 2	1	0 3	1	2	0	1		0	0	0	
SL	1862	1583	1862	1583	1770			1583				
LnCapacity	786	1583	929	1583	748			1583				
Flow Ratio	0.5	0.4	0.2	0.2	0.3			0.5				
v/c Ratio	1.17	0.43	0.31	0.20	0.78			0.47				
Grn Ratio	0.42	1.00	0.50	1.00	0.42			1.00				
I Factor	1.000		1.000		1.000							
AT or PVG	3	3	3	3	3			3				
Pltn Ratio	1.00	1.00	1.00	1.00	1.00			1.00				
PF2	1.00		1.00		1.00							
Q1	33.1		6.2		18.1							
kB	0.7	1.1	0.8	1.1	0.7			1.1				
Q2	20.5	0.9	0.4	0.3	2.3			1.0				
Q Average	53.6		6.6		20.4							
Q Spacing	25.0	25.0	25.0	25.0	25.0			25.0				
Q Storage	0	0	0	0	0			0				
Q S Ratio												
70th Percentile Output:												
fB%	1.1		1.2		1.2							
BOQ	60.4		7.8		23.6							
QSRatio												
85th Percentile Output:												
fB%	1.4		1.5		1.5							
BOQ	72.4		10.2		29.6							
QSRatio												
90th Percentile Output:												
fB%	1.4		1.7		1.5							
BOQ	76.6		11.2		31.4							
QSRatio												
95th Percentile Output:												
fB%	1.5		1.9		1.7							
BOQ	82.1		12.7		34.5							
QSRatio												
98th Percentile Output:												
fB%	1.7		2.3		1.9							
BOQ	92.1		15.2		38.9							
QSRatio												

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 NB Ramps

Inter.: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Volume		882	801		1856	1282	748		250			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left A			
Thru	A	A			Thru			
Right	A	A			Right A			
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right A			
SB Right					WB Right A			
Green	23.0	8.0	0.0		16.4	0.0		
Yellow	1.5	4.5			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1980	3547	0.47	0.56	8.1	A	4.4	A
R	1583	1583	0.53	1.00	0.4	A		
Westbound								
T	2833	5074	0.69	0.56	10.2	B	8.0	A
R	1583	1583	0.85	1.00	4.7	A		
Northbound								
L	939	3437	0.84	0.27	27.3	C		
							20.5	C
R	1583	1583	0.17	1.00	0.0+	A		
Southbound								

Intersection Delay = 9.1 (sec/veh) Intersection LOS = A

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		882	801		1856	1282	748		250			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		232	211		488	337	197		66			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900		1900			
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			
Adj Flow		928	843		1954	1349	787		263			
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0	0	0		0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0		0.0			
Arriv. Type		3	3		3	3	3		3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0		3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0		2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0		2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right	A		
SB Right					WB Right	A		
Green	23.0	8.0	0.0		16.4	0.0		
Yellow	1.5	4.5			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		882	801		1856	1282	748		250			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		928	843		1954	1349	787		263			
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
Lane group		T	R		T	R	L		R			
Adj flow		928	843		1954	1349	787		263			
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R		L	R				
So	1900	1900		1900	1900		1900	1900				
Lanes	0 2	1	0	3	1	0	2	1	0	0	0	
fW	1.000	1.000		1.000	1.000		1.000	1.000				
fHV	0.980	0.980		0.980	0.980		0.980	0.980				
fG	1.000	1.000		1.000	1.000		1.000	1.000				
fP	1.000	1.000		1.000	1.000		1.000	1.000				
fBB	1.000	1.000		1.000	1.000		1.000	1.000				
fA	1.000	1.000		1.000	1.000		1.000	1.000				
fLU	0.952	1.000		0.908	1.000		0.971	1.000				
fRT	1.000	0.850		1.000	0.850			0.850				
fLT	1.000			1.000			0.950					
Sec.												
fLpb	1.000			1.000			1.000					
fRpb	1.000	1.000		1.000	1.000			1.000				
S	3547	1583		5074	1583		3437	1583				
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	928	3547		0.26	0.56	1980	0.47
Right	R	843	1583		0.53	1.00	1583	0.53
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1954	5074		0.39	0.56	2833	0.69
Right	R	1349	1583	#	0.85	1.00	1583	0.85
Northbound								
Prot								
Perm								
Left	L	787	3437		0.23	0.27	939	0.84
Prot								
Perm								
Thru								
Right	R	263	1583		0.17	1.00	1583	0.17
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.85
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.85

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.47	0.56	7.9	1.000	1980	0.11	0.2	0.0	8.1	A	4.4	A
R	0.53	1.00	0.0	0.950	1583	0.14	0.4	0.0	0.4	A		
Westbound												
T	0.69	0.56	9.5	1.000	2833	0.26	0.7	0.0	10.2	B	8.0	A
R	0.85	1.00	0.0	0.950	1583	0.38	4.7	0.0	4.7	A		
Northbound												
L	0.84	0.27	20.5	1.000	939	0.37	6.8	0.0	27.3	C		
											20.5	C
R	0.17	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Southbound												

Intersection delay = 9.1 (sec/veh) Intersection LOS = A

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	13.3	7.9	0.00	0.0	0.0	8.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.4
Westbound								
	0.0						0.0	
T	0.0	0.00	13.3	9.5	0.00	0.0	0.0	10.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	4.7
Northbound								
L	0.0	0.00	21.8	20.5	0.00	0.0	0.0	27.3
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 9.1 sec/veh Intersection LOS A

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	T	R	T	R	L	R		
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0		
Flow Rate	487	843	717	1349	405	263		
So	1900	1900	1900	1900	1900	1900		
No.Lanes	0 2	1	0 3	1	2 0	1	0 0	0
SL	1862	1583	1862	1583	1770	1583		
LnCapacity	1039	1583	1040	1583	483	1583		
Flow Ratio	0.3	0.5	0.4	0.9	0.2	0.2		
v/c Ratio	0.47	0.53	0.69	0.85	0.84	0.17		
Grn Ratio	0.56	1.00	0.56	1.00	0.27	1.00		
I Factor	1.000		1.000		1.000			
AT or PVG	3	3	3	3	3	3		
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
PF2	1.00		1.00		1.00			
Q1	4.9		8.6		6.4			
kB	0.6	0.7	0.6	0.7	0.3	0.7		
Q2	0.5	0.8	1.2	3.7	1.6	0.1		
Q Average	5.3		9.8		7.9			
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0		
Q Storage	0	0	0	0	0	0		
Q S Ratio								
70th Percentile Output:								
fB%	1.2		1.2		1.2			
BOQ	6.3		11.5		9.4			
QSRatio								
85th Percentile Output:								
fB%	1.6		1.5		1.5			
BOQ	8.3		14.8		12.1			
QSRatio								
90th Percentile Output:								
fB%	1.7		1.6		1.7			
BOQ	9.1		16.1		13.2			
QSRatio								
95th Percentile Output:								
fB%	1.9		1.8		1.9			
BOQ	10.4		18.1		15.0			
QSRatio								
98th Percentile Output:								
fB%	2.4		2.2		2.2			
BOQ	12.6		21.2		17.8			
QSRatio								

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 SB Ramps

Inter.: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Volume		1385	760		1387	200				1125		983
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	15.6	7.5	0.0		26.4	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1561	3547	0.93	0.44	28.1	C	18.2	B
R	1583	1583	0.51	1.00	0.3	A		
Westbound								
T	2233	5074	0.65	0.44	15.0	B	13.1	B
R	1583	1583	0.13	1.00	0.0+	A		
Northbound								
Southbound								
L	1396	3437	0.85	0.41	22.6	C		
							25.6	C
R	1138	2803	0.91	0.41	29.0	C		

Intersection Delay = 19.5 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Macarthur at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 SB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1385	760		1387	200				1125		983
% Heavy Veh		2	2		2	2				2		2
PHF		0.95	0.95		0.95	0.95				0.95		0.95
PK 15 Vol		364	200		365	53				296		259
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900		1900	1900				1900		1900
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
LGConfig		T	R		T	R				L		R
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0
Adj Flow		1458	800		1460	211				1184		1035
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000
Peds Bikes	0			0			0			0		
Buses		0	0		0	0				0		0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0				0.0		0.0
Arriv. Type		3	3		3	3				3		3
Unit Ext.		3.0	3.0		3.0	3.0				3.0		3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0		2.0	2.0				2.0		2.0
Ext of g		2.0	2.0		2.0	2.0				2.0		2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	15.6	7.5	0.0		26.4	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1385	760		1387	200				1125		983
PHF		0.95	0.95		0.95	0.95				0.95		0.95
Adj flow		1458	800		1460	211				1184		1035
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
Lane group		T	R		T	R				L		R
Adj flow		1458	800		1460	211				1184		1035
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R					L		R
So	1900	1900		1900	1900					1900		1900
Lanes	0 2	1	0	3	1	0	0	0		2	0	2
fW	1.000	1.000		1.000	1.000					1.000		1.000
fHV	0.980	0.980		0.980	0.980					0.980		0.980
fG	1.000	1.000		1.000	1.000					1.000		1.000
fP	1.000	1.000		1.000	1.000					1.000		1.000
fBB	1.000	1.000		1.000	1.000					1.000		1.000
fA	1.000	1.000		1.000	1.000					1.000		1.000
fLU	0.952	1.000		0.908	1.000					0.971		0.885
fRT	1.000	0.850		1.000	0.850							0.850
fLT	1.000			1.000						0.950		
Sec.												
fLpb	1.000			1.000						1.000		
fRpb	1.000	1.000		1.000	1.000							1.000
S	3547	1583		5074	1583					3437		2803
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1458	3547	#	0.41	0.44	1561	0.93
Right	R	800	1583		0.51	1.00	1583	0.51
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1460	5074		0.29	0.44	2233	0.65
Right	R	211	1583		0.13	1.00	1583	0.13
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	1184	3437		0.34	0.41	1396	0.85
Prot								
Perm								
Thru								
Right	R	1035	2803	#	0.37	0.41	1138	0.91

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.78
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.92

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.93	0.44	17.3	1.000	1561	0.45	10.8	0.0	28.1	C	18.2	B
R	0.51	1.00	0.0	0.950	1583	0.11	0.3	0.0	0.3	A		
Westbound												
T	0.65	0.44	14.3	1.000	2233	0.23	0.7	0.0	15.0	B	13.1	B
R	0.13	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Northbound												
Southbound												
L	0.85	0.41	17.5	1.000	1396	0.38	5.1	0.0	22.6	C		

									25.6	C
R	0.91	0.41	18.2	1.000	1138	0.43	10.8	0.0	29.0	C

Intersection delay = 19.5 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	18.2	17.3	0.00	0.0	0.0	28.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.3
Westbound								
	0.0						0.0	
T	0.0	0.00	18.2	14.3	0.00	0.0	0.0	15.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
L	0.0	0.00	19.3	17.5	0.00	0.0	0.0	22.6
	0.0						0.0	
R	0.0	0.00	19.3	18.2	0.00	0.0	0.0	29.0

Intersection Delay 19.5 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound			Southbound		
LaneGroup	T	R	T	R				L		R
Init Queue	0.0	0.0	0.0	0.0				0.0		0.0
Flow Rate	765	800	535	211				609		584
So	1900	1900	1900	1900				1900		1900
No.Lanes	0 2	1	0 3	1	0	0	0	2	0	2
SL	1862	1583	1862	1583				1770		1584
LnCapacity	819	1583	819	1583				718		642
Flow Ratio	0.4	0.5	0.3	0.1				0.3		0.4
v/c Ratio	0.93	0.51	0.65	0.13				0.85		0.91
Grn Ratio	0.44	1.00	0.44	1.00				0.41		0.41
I Factor	1.000		1.000					1.000		
AT or PVG	3	3	3	3				3		3
Pltn Ratio	1.00	1.00	1.00	1.00				1.00		1.00
PF2	1.00		1.00					1.00		1.00
Q1	13.1		7.6					10.0		9.9
kB	0.5	0.7	0.5	0.7				0.5		0.4
Q2	4.3	0.8	0.9	0.1				2.2		3.1
Q Average	17.5		8.5					12.2		13.0
Q Spacing	25.0	25.0	25.0	25.0				25.0		25.0
Q Storage	0	0	0	0				0		0
Q S Ratio										
70th Percentile Output:										
fB%	1.2		1.2					1.2		1.2
BOQ	20.3		10.1					14.3		15.2
QSRatio										
85th Percentile Output:										
fB%	1.5		1.5					1.5		1.5
BOQ	25.6		13.0					18.3		19.4
QSRatio										
90th Percentile Output:										
fB%	1.6		1.7					1.6		1.6
BOQ	27.4		14.1					19.7		20.9
QSRatio										
95th Percentile Output:										
fB%	1.7		1.9					1.8		1.8
BOQ	30.2		16.0					22.0		23.3
QSRatio										
98th Percentile Output:										
fB%	2.0		2.2					2.1		2.1
BOQ	34.3		18.9					25.5		26.9
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 SB Ramps

Inter.: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Volume		1241	1060		1792	870				359		748
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	15.7	8.9	0.0		19.9	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1779	3547	0.73	0.50	13.4	B	7.9	A
R	1583	1583	0.70	1.00	1.5	A		
Westbound								
T	2545	5074	0.74	0.50	13.1	B	9.0	A
R	1583	1583	0.58	1.00	0.5	A		
Northbound								
Southbound								
L	1140	3437	0.33	0.33	15.2	B		
							22.5	C
R	930	2803	0.85	0.33	26.0	C		

Intersection Delay = 11.0 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 SB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1241	1060		1792	870				359	748	
% Heavy Veh		2	2		2	2				2	2	
PHF		0.95	0.95		0.95	0.95				0.95	0.95	
PK 15 Vol		327	279		472	229				94	197	
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900		1900	1900				1900	1900	
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0
Adj Flow		1306	1116		1886	916				378		787
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000
Peds Bikes	0			0			0			0		
Buses		0	0		0	0				0		0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0				0.0		0.0
Arriv. Type		3	3		3	3				3		3
Unit Ext.		3.0	3.0		3.0	3.0				3.0		3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0		2.0	2.0				2.0		2.0
Ext of g		2.0	2.0		2.0	2.0				2.0		2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	15.7	8.9	0.0		19.9	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1241	1060		1792	870				359	748	
PHF		0.95	0.95		0.95	0.95				0.95	0.95	
Adj flow		1306	1116		1886	916				378	787	
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
Lane group		T	R		T	R				L		R
Adj flow		1306	1116		1886	916				378		787
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R					L		R
So	1900	1900		1900	1900					1900		1900
Lanes	0 2	1	0	3	1	0	0	0		2	0	2
fW	1.000	1.000		1.000	1.000					1.000		1.000
fHV	0.980	0.980		0.980	0.980					0.980		0.980
fG	1.000	1.000		1.000	1.000					1.000		1.000
fP	1.000	1.000		1.000	1.000					1.000		1.000
fBB	1.000	1.000		1.000	1.000					1.000		1.000
fA	1.000	1.000		1.000	1.000					1.000		1.000
fLU	0.952	1.000		0.908	1.000					0.971		0.885
fRT	1.000	0.850		1.000	0.850							0.850
fLT	1.000			1.000						0.950		
Sec.												
fLpb	1.000			1.000						1.000		
fRpb	1.000	1.000		1.000	1.000							1.000
S	3547	1583		5074	1583					3437		2803
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1306	3547		0.37	0.50	1779	0.73
Right	R	1116	1583	#	0.70	1.00	1583	0.70
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1886	5074		0.37	0.50	2545	0.74
Right	R	916	1583		0.58	1.00	1583	0.58
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	378	3437		0.11	0.33	1140	0.33
Prot								
Perm								
Thru								
Right	R	787	2803		0.28	0.33	930	0.85

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.70
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.70

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.73	0.50	11.8	1.000	1779	0.29	1.6	0.0	13.4	B	7.9	A
R	0.70	1.00	0.0	0.950	1583	0.27	1.5	0.0	1.5	A		
Westbound												
T	0.74	0.50	11.9	1.000	2545	0.30	1.2	0.0	13.1	B	9.0	A
R	0.58	1.00	0.0	0.950	1583	0.17	0.5	0.0	0.5	A		
Northbound												
Southbound												
L	0.33	0.33	15.1	1.000	1140	0.11	0.2	0.0	15.2	B		

```
                                                                    22.5   C
R    0.85  0.33  18.6  1.000 930   0.38   7.3   0.0   26.0   C
_____________________________________________________________________________
          Intersection delay = 11.0  (sec/veh)   Intersection LOS = B


_____________________SUPPLEMENTAL PERMITTED LT WORKSHEET_____________________
                            for exclusive lefts
Input
                                                        EB    WB    NB    SB
Opposed by Single(S) or Multiple(M) lane approach
Cycle length, C                          60.0    sec
Total actual green time for LT lane group, G (s)
Effective permitted green time for LT lane group, g(s)
Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo                        0.908 0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g  or  fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____________________SUPPLEMENTAL PERMITTED LT WORKSHEET_____________________
                              for shared lefts
Input
                                                        EB    WB    NB    SB
Opposed by Single(S) or Multiple(M) lane approach
Cycle length, C                          60.0    sec
Total actual green time for LT lane group, G (s)
Effective permitted green time for LT lane group, g(s)
Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT                  0.000 0.000
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo                        0.908 0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
```

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	14.9	11.8	0.00	0.0	0.0	13.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.5
Westbound								
	0.0						0.0	
T	0.0	0.00	14.9	11.9	0.00	0.0	0.0	13.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.5
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
L	0.0	0.00	20.1	15.1	0.00	0.0	0.0	15.2
	0.0						0.0	
R	0.0	0.00	20.1	18.6	0.00	0.0	0.0	26.0

Intersection Delay 11.0 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound			Southbound		
LaneGroup	T	R	T	R				L		R
Init Queue	0.0	0.0	0.0	0.0				0.0		0.0
Flow Rate	685	1116	692	916				194		444
So	1900	1900	1900	1900				1900		1900
No.Lanes	0 2	1	0 3	1	0	0	0	2	0	2
SL	1862	1583	1862	1583				1770		1584
LnCapacity	934	1583	934	1583				587		525
Flow Ratio	0.4	0.7	0.4	0.6				0.1		0.3
v/c Ratio	0.73	0.70	0.74	0.58				0.33		0.85
Grn Ratio	0.50	1.00	0.50	1.00				0.33		0.33
I Factor	1.000		1.000					1.000		
AT or PVG	3	3	3	3				3		3
Pltn Ratio	1.00	1.00	1.00	1.00				1.00		1.00
PF2	1.00		1.00					1.00		1.00
Q1	9.0		9.1					2.4		6.9
kB	0.5	0.7	0.5	0.7				0.4		0.4
Q2	1.4	1.7	1.4	1.0				0.2		1.7
Q Average	10.4		10.6					2.6		8.6
Q Spacing	25.0	25.0	25.0	25.0				25.0		25.0
Q Storage	0	0	0	0				0		0
Q S Ratio										
70th Percentile Output:										
fB%	1.2		1.2					1.2		1.2
BOQ	12.2		12.4					3.1		10.1
QSRatio										
85th Percentile Output:										
fB%	1.5		1.5					1.6		1.5
BOQ	15.7		16.0					4.1		13.1
QSRatio										
90th Percentile Output:										
fB%	1.6		1.6					1.8		1.7
BOQ	17.0		17.3					4.6		14.3
QSRatio										
95th Percentile Output:										
fB%	1.8		1.8					2.0		1.9
BOQ	19.1		19.4					5.3		16.1
QSRatio										
98th Percentile Output:										
fB%	2.2		2.1					2.5		2.2
BOQ	22.3		22.6					6.6		19.1
QSRatio										

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 NB Ramps

Inter.: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Dyer Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L	LTR	R			
Volume		2534	550		1269	390	901	0	786			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru	A			
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right					EB Right	A			
SB Right					WB Right				
Green	42.9	14.2	0.0			53.3	0.0		
Yellow	4.0	4.0				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 125.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	2521	5074	1.06	0.50	67.1	E	55.1	E
R	1583	1583	0.37	1.00	0.1	A		
Westbound								
TR	2432	4895	0.72	0.50	25.7	C	25.7	C
Northbound								
L	755	1770	1.26	0.43	161.6	F		
LTR	794	1863	0.00	0.43	20.6	C	156.2	F
R	675	1583	1.23	0.43	150.1	F		
Southbound								

Intersection Delay = 74.0 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Dyer at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 NB Ramps N/S St: Dyer Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		2534	550		1269	390	901	0	786			
% Heavy Veh		2	2		2	2	2	2	2			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
PK 15 Vol		667	145		334	103	237	0	207			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900		1900	1900	1900			
ParkExist												
NumPark												
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L	LTR	R			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol		0			0			0				
Adj Flow		2667	579		1747		948	0	827			
%InSharedLn							0		0			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.235			0.000	1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0		0	0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0		0.0	0.0	0.0			
Arriv. Type		3	3		3		3	3	3			
Unit Ext.		3.0	3.0		3.0		3.0	3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0		2.0	2.0	2.0			
Ext of g		2.0	2.0		2.0		2.0	2.0	2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right			
Green	42.9	14.2	0.0			53.3	0.0	
Yellow	4.0	4.0				3.6		
All Red	1.0	1.0				1.0		

Cycle Length: 125.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		2534	550		1269	390	901	0	786			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
Adj flow		2667	579		1336	411	948	0	827			
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
Lane group		T	R		TR		L	LTR	R			
Adj flow		2667	579		1747		948	0	827			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.235			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		TR			L	LTR	R			
So	1900	1900		1900			1900	1900	1900			
Lanes	0 3	1	0	3	0		1	1	1	0	0	0
fW	1.000	1.000		1.000			1.000	1.000	1.000			
fHV	0.980	0.980		0.980			0.980	0.980	0.980			
fG	1.000	1.000		1.000			1.000	1.000	1.000			
fP	1.000	1.000		1.000			1.000	1.000	1.000			
fBB	1.000	1.000		1.000			1.000	1.000	1.000			
fA	1.000	1.000		1.000			1.000	1.000	1.000			
fLU	0.908	1.000		0.908			1.000	1.000	1.000			
fRT	1.000	0.850		0.965				1.000	0.850			
fLT	1.000			1.000			0.950	1.000				
Sec.												
fLpb	1.000			1.000			1.000	1.000				
fRpb	1.000	1.000		1.000				1.000	1.000			
S	5074	1583		4895			1770	1863	1583			
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2667	5074	#	0.53	0.50	2521	1.06
Right	R	579	1583		0.37	1.00	1583	0.37
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1747	4895		0.36	0.50	2432	0.72
Right								
Northbound								
Prot								
Perm								
Left	L	948	1770	#	0.54	0.43	755	1.26
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.43	794	0.00
Right	R	827	1583		0.52	0.43	675	1.23
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.06
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.15

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	1.06	0.50	31.5	1.000	2521	0.50	35.6	0.0	67.1	E	55.1	E
R	0.37	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Westbound												
TR	0.72	0.50	24.6	1.000	2432	0.28	1.0	0.0	25.7	C	25.7	C
Northbound												
L	1.26	0.43	35.9	1.000	755	0.50	125.7	0.0	161.6	F		
LTR	0.00	0.43	20.6	1.000	794	0.11	0.0	0.0	20.6	C	156.2	F
R	1.23	0.43	35.9	1.000	675	0.50	114.2	0.0	150.1	F		
Southbound												

Intersection delay = 74.0 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	125.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	31.5	31.5	0.00	36.5	0.0	67.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Westbound								
	0.0						0.0	
TR	0.0	0.00	31.5	24.6	0.00	0.0	0.0	25.7
	0.0						0.0	
Northbound								
L	0.0	0.00	35.9	35.9	0.00	48.3	0.0	161.6
LTR	0.0	0.00	35.9	20.6	0.00	0.0	0.0	20.6
R	0.0	0.00	35.9	35.9	0.00	38.0	0.0	150.1
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 74.0 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound	Northbound			Southbound		
LaneGroup	T	R	TR	L	LTR	R			
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0			
Flow Rate	979	579	641	948	0	827			
So	1900	1900	1900	1900	1900	1900			
No.Lanes	0 3	1	0 3 0	1	1	1	0	0	0
SL	1862	1583	1796	1770	1863	1583			
LnCapacity	925	1583	892	755	794	675			
Flow Ratio	0.5	0.4	0.4	0.5	0.0	0.5			
v/c Ratio	1.06	0.37	0.72	1.26	0.00	1.23			
Grn Ratio	0.50	1.00	0.50	0.43	0.43	0.43			
I Factor	1.000		1.000		1.000				
AT or PVG	3	3	3	3	3	3			
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00			
PF2	1.00		1.00	1.00	1.00	1.00			
Q1	34.0		17.4	32.9	0.0	28.7			
kB	0.8	1.1	0.8	0.7	0.7	0.7			
Q2	13.8	0.6	1.9	27.2	0.0	22.1			
Q Average	47.8		19.3	60.1	0.0	50.8			
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0			
Q Storage	0	0	0	0	0	0			
Q S Ratio									
70th Percentile Output:									
fB%	1.1		1.2	1.1	1.2	1.1			
BOQ	54.1		22.4	67.5	0.0	57.3			
QSRatio									
85th Percentile Output:									
fB%	1.4		1.5	1.3	1.6	1.4			
BOQ	65.1		28.1	80.6	0.0	68.9			
QSRatio									
90th Percentile Output:									
fB%	1.4		1.6	1.4	1.8	1.4			
BOQ	68.7		30.0	85.4	0.0	72.7			
QSRatio									
95th Percentile Output:									
fB%	1.5		1.7	1.5	2.1	1.5			
BOQ	73.8		32.9	91.5	0.0	78.0			
QSRatio									
98th Percentile Output:									
fB%	1.7		1.9	1.7	2.7	1.7			
BOQ	82.5		37.2	103	0.0	87.4			
QSRatio									

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 NB Ramps

Inter.: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Dyer Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L	LTR	R			
Volume		1339	1020		1879	1400	281	0	111			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru	A			
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right					EB Right	A			
SB Right					WB Right				
Green	57.8	33.0	0.0			19.6	0.0		
Yellow	4.0	4.0				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 125.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	3889	5074	0.36	0.77	4.8	A	3.2	A
R	1583	1583	0.68	1.00	1.2	A		
Westbound								
TR	3640	4749	0.95	0.77	19.0	B	19.0	B
Northbound								
L	278	1770	1.06	0.16	124.8	F		
LTR	292	1863	0.00	0.16	44.4	D	103.5	F
R	248	1583	0.47	0.16	49.4	D		
Southbound								

Intersection Delay = 18.3 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 NB Ramps N/S St: Dyer Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1339	1020		1879	1400	281	0	111			
% Heavy Veh		2	2		2	2	2	2	2			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
PK 15 Vol		352	268		494	368	74	0	29			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900		1900	1900	1900			
ParkExist												
NumPark												
No. Lanes	0	3	1	0	3	0		1	1	1	0	0	0
LGConfig		T	R		TR		L		LTR	R			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			
Adj Flow		1409	1074		3452		296	0	117			
%InSharedLn							0		0			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.427			0.000	1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0		0	0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0		0.0	0.0	0.0			
Arriv. Type		3	3		3		3	3	3			
Unit Ext.		3.0	3.0		3.0		3.0	3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0		2.0	2.0	2.0			
Ext of g		2.0	2.0		2.0		2.0	2.0	2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right			
Green	57.8	33.0	0.0			19.6	0.0	
Yellow	4.0	4.0				3.6		
All Red	1.0	1.0				1.0		

Cycle Length: 125.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1339	1020		1879	1400	281	0	111			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
Adj flow		1409	1074		1978	1474	296	0	117			
No. Lanes	0	3	1	0	3	0		1	1	1	0	0	0
Lane group		T	R		TR		L		LTR	R			
Adj flow		1409	1074		3452		296	0	117			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.427			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		TR			L	LTR	R			
So	1900	1900		1900			1900	1900	1900			
Lanes	0 3	0 1	0	0 3	0		0 1	0 1	0 1	0	0	0
fW	1.000	1.000		1.000			1.000	1.000	1.000			
fHV	0.980	0.980		0.980			0.980	0.980	0.980			
fG	1.000	1.000		1.000			1.000	1.000	1.000			
fP	1.000	1.000		1.000			1.000	1.000	1.000			
fBB	1.000	1.000		1.000			1.000	1.000	1.000			
fA	1.000	1.000		1.000			1.000	1.000	1.000			
fLU	0.908	1.000		0.908			1.000	1.000	1.000			
fRT	1.000	0.850		0.936				1.000	0.850			
fLT	1.000			1.000			0.950	1.000				
Sec.												
fLpb	1.000			1.000			1.000	1.000				
fRpb	1.000	1.000		1.000				1.000	1.000			
S	5074	1583		4749			1770	1863	1583			
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1409	5074		0.28	0.77	3889	0.36
Right	R	1074	1583		0.68	1.00	1583	0.68
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	3452	4749	#	0.73	0.77	3640	0.95
Right								
Northbound								
Prot								
Perm								
Left	L	296	1770	#	0.17	0.16	278	1.06
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.16	292	0.00
Right	R	117	1583		0.07	0.16	248	0.47
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.89
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.97

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.36	0.77	4.7	1.000	3889	0.11	0.1	0.0	4.8	A	3.2	A
R	0.68	1.00	0.0	0.950	1583	0.25	1.2	0.0	1.2	A		
Westbound												
TR	0.95	0.77	12.5	1.000	3640	0.46	6.5	0.0	19.0	B	19.0	B
Northbound												
L	1.06	0.16	52.7	1.000	278	0.50	72.1	0.0	124.8	F		
LTR	0.00	0.16	44.4	1.000	292	0.11	0.0	0.0	44.4	D	103.5	F
R	0.47	0.16	48.0	1.000	248	0.11	1.4	0.0	49.4	D		
Southbound												

Intersection delay = 18.3 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	125.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	14.6	4.7	0.00	0.0	0.0	4.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.2
Westbound								
	0.0						0.0	
TR	0.0	0.00	14.6	12.5	0.00	0.0	0.0	19.0
	0.0						0.0	
Northbound								
L	0.0	0.00	52.7	52.7	0.00	4.5	0.0	124.8
LTR	0.0	0.00	52.7	44.4	0.00	0.0	0.0	44.4
R	0.0	0.00	52.7	48.0	0.00	0.0	0.0	49.4
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 18.3 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound	Northbound			Southbound
LaneGroup	T	R	TR	L	LTR	R	
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate	517	1074	1267	296	0	117	
So	1900	1900	1900	1900	1900	1900	
No.Lanes	3	1	3	1	1	1	0
SL	1862	1583	1743	1770	1863	1583	
LnCapacity	1427	1583	1336	278	292	248	
Flow Ratio	0.3	0.7	0.7	0.2	0.0	0.1	
v/c Ratio	0.36	0.68	0.95	1.06	0.00	0.47	
Grn Ratio	0.77	1.00	0.77	0.16	0.16	0.16	
I Factor	1.000		1.000		1.000		
AT or PVG	3	3	3	3	3	3	
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF2	1.00		1.00	1.00	1.00	1.00	
Q1	5.8		37.6	10.3	0.0	3.7	
kB	1.0	1.1	1.0	0.4	0.4	0.4	
Q2	0.6	2.3	9.0	5.1	0.0	0.3	
Q Average	6.4		46.6	15.4	0.0	4.0	
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage	0	0	0	0	0	0	
Q S Ratio							
70th Percentile Output:							
fB%	1.2		1.1	1.2	1.2	1.2	
BOQ	7.6		52.7	17.9	0.0	4.8	
QSRatio							
85th Percentile Output:							
fB%	1.5		1.4	1.5	1.6	1.6	
BOQ	9.9		63.5	22.7	0.0	6.3	
QSRatio							
90th Percentile Output:							
fB%	1.7		1.4	1.6	1.8	1.7	
BOQ	10.8		67.1	24.4	0.0	6.9	
QSRatio							
95th Percentile Output:							
fB%	1.9		1.5	1.8	2.1	2.0	
BOQ	12.3		72.0	27.0	0.0	8.0	
QSRatio							
98th Percentile Output:							
fB%	2.3		1.7	2.0	2.7	2.4	
BOQ	14.8		80.5	30.8	0.0	9.8	
QSRatio							

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 SB Ramps

Inter.: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Grand Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Volume				456		345		995			684	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	22.0	0.0			9.6	12.9	0.0	
Yellow	3.6				4.0	4.0		
All Red	1.0				1.0	1.9		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	649	1770	0.74	0.37	21.0	C		
							19.6	B
R	580	1583	0.63	0.37	17.8	B		
Northbound								
T	1626	3547	0.64	0.46	13.4	B	13.4	B
Southbound								
T	2326	5074	0.31	0.46	10.3	B	10.3	B

Intersection Delay = 14.5 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Grand at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 SB Ramps N/S St: Grand Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				456	345			995			684	
% Heavy Veh				2	2			2			2	
PHF				0.95	0.95			0.95			0.95	
PK 15 Vol				120	91			262			180	
Hi Ln Vol												
% Grade				0				0			0	
Ideal Sat				1900	1900			1900			1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						
Adj Flow				480		363		1047			720	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	
Peds Bikes	0			0								
Buses				0		0		0			0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0			0.0	
Arriv. Type				3		3		3			3	
Unit Ext.				3.0		3.0		3.0			3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0			2.0	
Ext of g				2.0		2.0		2.0			2.0	
Ped Min g		3.2			3.2							

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		22.0	0.0			9.6	12.9	0.0
Yellow		3.6				4.0	4.0	
All Red		1.0				1.0	1.9	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				456	345			995			684	
PHF				0.95	0.95			0.95			0.95	
Adj flow				480	363			1047			720	
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
Lane group				L		R		T			T	
Adj flow				480		363		1047			720	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T			T		
So				1900		1900	1900			1900		
Lanes	0	0	0	1	0	1	0	2	0	0	3	0
fW				1.000		1.000		1.000			1.000	
fHV				0.980		0.980		0.980			0.980	
fG				1.000		1.000		1.000			1.000	
fP				1.000		1.000		1.000			1.000	
fBB				1.000		1.000		1.000			1.000	
fA				1.000		1.000		1.000			1.000	
fLU				1.000		1.000		0.952			0.908	
fRT						0.850		1.000			1.000	
fLT				0.950				1.000			1.000	
Sec.												
fLpb				1.000				1.000			1.000	
fRpb						1.000		1.000			1.000	
S				1770		1583		3547			5074	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	480	1770	#	0.27	0.37	649	0.74
Prot								
Perm								
Thru								
Right	R	363	1583		0.23	0.37	580	0.63
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1047	3547	#	0.30	0.46	1626	0.64
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	720	5074		0.14	0.46	2326	0.31
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.57
Total lost time per cycle, L = 10.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.69

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor Del k	d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.74	0.37	16.5	1.000	649	0.30	4.5	0.0	21.0	C		
											19.6	B
R	0.63	0.37	15.6	1.000	580	0.21	2.1	0.0	17.8	B		
Northbound												
T	0.64	0.46	12.5	1.000	1626	0.22	0.9	0.0	13.4	B	13.4	B
Southbound												

T 0.31 0.46 10.3 1.000 2326 0.11 0.1 0.0 10.3 B 10.3 B

Intersection delay = 14.5 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.0	16.5	0.00	0.0	0.0	21.0
	0.0						0.0	
R	0.0	0.00	19.0	15.6	0.00	0.0	0.0	17.8
Northbound								
	0.0						0.0	
T	0.0	0.00	16.3	12.5	0.00	0.0	0.0	13.4
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	16.3	10.3	0.00	0.0	0.0	10.3
	0.0						0.0	

Intersection Delay 14.5 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound		Northbound	Southbound
LaneGroup		L	R	T	T
Init Queue		0.0	0.0	0.0	0.0
Flow Rate		480	363	549	264
So		1900	1900	1900	1900
No.Lanes	0 0 0	1 0	1	0 2 0	0 3 0
SL		1770	1583	1862	1862
LnCapacity		649	580	853	853
Flow Ratio		0.3	0.2	0.3	0.1
v/c Ratio		0.74	0.63	0.64	0.31
Grn Ratio		0.37	0.37	0.46	0.46
I Factor		1.000		1.000	1.000
AT or PVG		3	3	3	3
Pltn Ratio		1.00	1.00	1.00	1.00
PF2		1.00	1.00	1.00	1.00
Q1		7.0	5.0	7.0	2.8
kB		0.4	0.4	0.5	0.5
Q2		1.1	0.6	0.9	0.2
Q Average		8.1	5.6	7.9	3.0
Q Spacing		25.0	25.0	25.0	25.0
Q Storage		0	0	0	0
Q S Ratio					
70th Percentile Output:					
fB%		1.2	1.2	1.2	1.2
BOQ		9.5	6.7	9.3	3.6
QSRatio					
85th Percentile Output:					
fB%		1.5	1.5	1.5	1.6
BOQ		12.4	8.7	12.1	4.7
QSRatio					
90th Percentile Output:					
fB%		1.7	1.7	1.7	1.7
BOQ		13.5	9.6	13.2	5.2
QSRatio					
95th Percentile Output:					
fB%		1.9	1.9	1.9	2.0
BOQ		15.2	10.9	14.9	6.0
QSRatio					
98th Percentile Output:					
fB%		2.2	2.3	2.2	2.5
BOQ		18.1	13.2	17.7	7.5
QSRatio					

HCS+: Signalized Intersections Release 5.3

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project
E/W St: SR-55 SB Ramps

Inter.: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Grand Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Volume				321		249		801			759	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	20.5	0.0			19.9	4.1	0.0	
Yellow	3.6				4.0	4.0		
All Red	1.0				1.0	1.9		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	605	1770	0.56	0.34	17.2	B		
							16.8	B
R	541	1583	0.48	0.34	16.3	B		
Northbound								
T	1714	3547	0.49	0.48	10.7	B	10.7	B
Southbound								
T	2452	5074	0.33	0.48	9.6	A	9.6	A

Intersection Delay = 11.9 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.3

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Grand at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project

E/W St: SR-55 SB Ramps N/S St: Grand Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				321	249		801			759		
% Heavy Veh				2	2		2			2		
PHF				0.95	0.95		0.95			0.95		
PK 15 Vol				84	66		211			200		
Hi Ln Vol												
% Grade				0			0			0		
Ideal Sat				1900	1900		1900			1900		
ParkExist												
NumPark												
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						
Adj Flow				338		262		843			799	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	
Peds Bikes	0			0								
Buses				0		0		0			0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0			0.0	
Arriv. Type				3		3		3			3	
Unit Ext.				3.0		3.0		3.0			3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0			2.0	
Ext of g				2.0		2.0		2.0			2.0	
Ped Min g		3.2			3.2							

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right				
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green		20.5	0.0			19.9	4.1	0.0	
Yellow		3.6				4.0	4.0		
All Red		1.0				1.0	1.9		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				321	249		801			759		
PHF				0.95	0.95		0.95			0.95		
Adj flow				338	262		843			799		
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
Lane group				L		R		T			T	
Adj flow				338		262		843			799	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T			T		
So				1900		1900	1900			1900		
Lanes	0	0	0	1	0	1	0	2	0	0	3	0
fW				1.000		1.000		1.000			1.000	
fHV				0.980		0.980		0.980			0.980	
fG				1.000		1.000		1.000			1.000	
fP				1.000		1.000		1.000			1.000	
fBB				1.000		1.000		1.000			1.000	
fA				1.000		1.000		1.000			1.000	
fLU				1.000		1.000		0.952			0.908	
fRT						0.850		1.000			1.000	
fLT				0.950				1.000			1.000	
Sec.												
fLpb				1.000				1.000			1.000	
fRpb						1.000		1.000			1.000	
S				1770		1583		3547			5074	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	338	1770	#	0.19	0.34	605	0.56
Prot								
Perm								
Thru								
Right	R	262	1583		0.17	0.34	541	0.48
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	843	3547	#	0.24	0.48	1714	0.49
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	799	5074		0.16	0.48	2452	0.33
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.43
Total lost time per cycle, L = 10.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.52

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor Del k	d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.56	0.34	16.1	1.000	605	0.16	1.2	0.0	17.2	B		
											16.8	B
R	0.48	0.34	15.6	1.000	541	0.11	0.7	0.0	16.3	B		
Northbound												
T	0.49	0.48	10.5	1.000	1714	0.11	0.2	0.0	10.7	B	10.7	B
Southbound												

T	0.33	0.48	9.5	1.000	2452	0.11	0.1	0.0	9.6	A	9.6	A

Intersection delay = 11.9 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.8	16.1	0.00	0.0	0.0	17.2
	0.0						0.0	
R	0.0	0.00	19.8	15.6	0.00	0.0	0.0	16.3
Northbound								
	0.0						0.0	
T	0.0	0.00	15.5	10.5	0.00	0.0	0.0	10.7
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	15.5	9.5	0.00	0.0	0.0	9.6
	0.0						0.0	

Intersection Delay 11.9 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound		Northbound	Southbound
LaneGroup		L	R	T	T
Init Queue		0.0	0.0	0.0	0.0
Flow Rate		338	262	442	293
So		1900	1900	1900	1900
No.Lanes	0 0 0	1 0	1	0 2 0	0 3 0
SL		1770	1583	1862	1862
LnCapacity		605	541	900	900
Flow Ratio		0.2	0.2	0.2	0.2
v/c Ratio		0.56	0.48	0.49	0.33
Grn Ratio		0.34	0.34	0.48	0.48
I Factor		1.000		1.000	1.000
AT or PVG		3	3	3	3
Pltn Ratio		1.00	1.00	1.00	1.00
PF2		1.00	1.00	1.00	1.00
Q1		4.6	3.4	5.0	3.0
kB		0.4	0.4	0.5	0.5
Q2		0.5	0.3	0.5	0.2
Q Average		5.1	3.8	5.5	3.2
Q Spacing		25.0	25.0	25.0	25.0
Q Storage		0	0	0	0
Q S Ratio					
70th Percentile Output:					
fB%		1.2	1.2	1.2	1.2
BOQ		6.0	4.5	6.5	3.9
QSRatio					
85th Percentile Output:					
fB%		1.6	1.6	1.5	1.6
BOQ		7.9	5.9	8.5	5.1
QSRatio					
90th Percentile Output:					
fB%		1.7	1.7	1.7	1.7
BOQ		8.7	6.6	9.3	5.6
QSRatio					
95th Percentile Output:					
fB%		2.0	2.0	1.9	2.0
BOQ		9.9	7.5	10.6	6.5
QSRatio					
98th Percentile Output:					
fB%		2.4	2.4	2.4	2.5
BOQ		12.1	9.3	12.9	8.0
QSRatio					

Appendix I-7 **Existing General Plan Build-out HCS Intersection Worksheets**

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps

Inter.: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Volume	506		419					1224	241		2238	322
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	12.2	0.0				16.7	15.1	0.0	
Yellow	3.6					3.6	4.3		
All Red	1.5					1.5	1.5		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	980	4820	0.54	0.20	22.0	C		
							25.3	C
R	570	2803	0.77	0.20	29.2	C		
Westbound								
Northbound								
T	3121	5074	0.41	0.62	6.0	A	5.1	A
R	1583	1583	0.16	1.00	0.0+	A		
Southbound								
T	3121	5074	0.75	0.62	9.4	A	8.2	A
R	1583	1583	0.21	1.00	0.1	A		

Intersection Delay = 10.5 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Culver at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Baseline + Exist. GP Buildout

E/W St: I-5 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	506		419					1224	241		2238	322
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	133		110					322	63		589	85
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	533		441					1288	254		2356	339
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	12.2	0.0			16.7	15.1	0.0	
Yellow	3.6				3.6	4.3		
All Red	1.5				1.5	1.5		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	506		419					1224	241		2238	322
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	533		441					1288	254		2356	339
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
Lane group	L		R					T	R		T	R
Adj flow	533		441					1288	254		2356	339
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound			Southbound	
LG	L		R				T	R		T	R
So	1900		1900				1900	1900		1900	1900
Lanes	3	0	2	0	0	0	3	1	0	3	1
fW	1.000		1.000				1.000	1.000		1.000	1.000
fHV	0.980		0.980				0.980	0.980		0.980	0.980
fG	1.000		1.000				1.000	1.000		1.000	1.000
fP	1.000		1.000				1.000	1.000		1.000	1.000
fBB	1.000		1.000				1.000	1.000		1.000	1.000
fA	1.000		1.000				1.000	1.000		1.000	1.000
fLU	0.908		0.885				0.908	1.000		0.908	1.000
fRT			0.850				1.000	0.850		1.000	0.850
fLT	0.950						1.000			1.000	
Sec.											
fLpb	1.000						1.000			1.000	
fRpb			1.000				1.000	1.000		1.000	1.000
S	4820		2803				5074	1583		5074	1583
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	533	4820		0.11	0.20	980	0.54
Prot								
Perm								
Thru								
Right	R	441	2803	#	0.16	0.20	570	0.77
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1288	5074		0.25	0.62	3121	0.41
Right	R	254	1583		0.16	1.00	1583	0.16
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2356	5074	#	0.46	0.62	3121	0.75
Right	R	339	1583		0.21	1.00	1583	0.21

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.62
Total lost time per cycle, L = 10.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.76

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.54	0.20	21.4	1.000	980	0.14	0.6	0.0	22.0	C		
											25.3	C
R	0.77	0.20	22.6	1.000	570	0.32	6.6	0.0	29.2	C		
Westbound												
Northbound												
T	0.41	0.62	6.0	1.000	3121	0.11	0.1	0.0	6.0	A	5.1	A
R	0.16	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Southbound												

T	0.75	0.62	8.3	1.000	3121	0.31	1.1	0.0	9.4	A	8.2	A
R	0.21	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 10.5 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	23.9	21.4	0.00	0.0	0.0	22.0

	0.0						0.0	
R	0.0	0.00	23.9	22.6	0.00	0.0	0.0	29.2
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	11.5	6.0	0.00	0.0	0.0	6.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Southbound								
	0.0						0.0	
T	0.0	0.00	11.5	8.3	0.00	0.0	0.0	9.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 10.5 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	195	249			472	254	864	339
So	1900	1900			1900	1900	1900	1900
No.Lanes	3 0 2		0 0 0		0 3	1	0 3	1
SL	1769	1584			1862	1583	1862	1583
LnCapacity	359	322			1145	1583	1145	1583
Flow Ratio	0.1	0.2			0.3	0.2	0.5	0.2
v/c Ratio	0.54	0.77			0.41	0.16	0.75	0.21
Grn Ratio	0.20	0.20			0.62	1.00	0.62	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	2.9	3.9			4.1		10.3	
kB	0.3	0.3			0.6	0.7	0.6	0.7
Q2	0.3	0.9			0.4	0.1	1.7	0.2
Q Average	3.3	4.8			4.5		12.1	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	3.9	5.7			5.3		14.2	
QSRatio								
85th Percentile Output:								
fB%	1.6	1.6			1.6		1.5	
BOQ	5.1	7.4			7.0		18.1	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.7			1.7		1.6	
BOQ	5.7	8.2			7.7		19.5	
QSRatio								
95th Percentile Output:								
fB%	2.0	2.0			2.0		1.8	
BOQ	6.5	9.4			8.8		21.8	
QSRatio								
98th Percentile Output:								
fB%	2.5	2.4			2.4		2.1	
BOQ	8.1	11.4			10.8		25.3	
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps

Inter.: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Volume	1001		935					2059	310		1485	250
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	34.7	0.0				8.7	30.6	0.0	
Yellow	3.6					3.6	4.3		
All Red	1.5					1.5	1.5		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1858	4820	0.57	0.39	22.2	C		
							29.6	C
R	1081	2803	0.91	0.39	37.5	D		
Westbound								
Northbound								
T	2503	5074	0.87	0.49	23.6	C	20.6	C
R	1583	1583	0.21	1.00	0.1	A		
Southbound								
T	2503	5074	0.62	0.49	17.2	B	14.7	B
R	1583	1583	0.17	1.00	0.0+	A		

Intersection Delay = 21.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Culver at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Baseline + Exist. GP Buildout

E/W St: I-5 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	1001		935					2059	310		1485	250
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	263		246					542	82		391	66
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	1054		984					2167	326		1563	263
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	34.7	0.0			8.7	30.6	0.0	
Yellow	3.6				3.6	4.3		
All Red	1.5				1.5	1.5		

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	1001		935					2059	310		1485	250
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	1054		984					2167	326		1563	263
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
Lane group	L		R					T	R		T	R
Adj flow	1054		984					2167	326		1563	263
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound					Westbound					Northbound			Southbound	
LG	L		R								T	R		T	R
So	1900		1900								1900	1900		1900	1900
Lanes	3	0	2	0	0	0	0				3	1	0	3	1
fW	1.000		1.000								1.000	1.000		1.000	1.000
fHV	0.980		0.980								0.980	0.980		0.980	0.980
fG	1.000		1.000								1.000	1.000		1.000	1.000
fP	1.000		1.000								1.000	1.000		1.000	1.000
fBB	1.000		1.000								1.000	1.000		1.000	1.000
fA	1.000		1.000								1.000	1.000		1.000	1.000
fLU	0.908		0.885								0.908	1.000		0.908	1.000
fRT			0.850								1.000	0.850		1.000	0.850
fLT	0.950										1.000			1.000	
Sec.															
fLpb	1.000										1.000			1.000	
fRpb			1.000								1.000	1.000		1.000	1.000
S	4820		2803								5074	1583		5074	1583
Sec.															

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	1054	4820		0.22	0.39	1858	0.57
Prot								
Perm								
Thru								
Right	R	984	2803	#	0.35	0.39	1081	0.91
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2167	5074	#	0.43	0.49	2503	0.87
Right	R	326	1583		0.21	1.00	1583	0.21
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1563	5074		0.31	0.49	2503	0.62
Right	R	263	1583		0.17	1.00	1583	0.17

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.78
Total lost time per cycle, L = 10.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.89

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.57	0.39	21.7	1.000	1858	0.16	0.4	0.0	22.2	C		
											29.6	C
R	0.91	0.39	26.2	1.000	1081	0.43	11.3	0.0	37.5	D		
Westbound												
Northbound												
T	0.87	0.49	20.2	1.000	2503	0.40	3.5	0.0	23.6	C	20.6	C
R	0.21	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.62	0.49	16.7	1.000	2503	0.21	0.5	0.0	17.2	B	14.7	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		

Intersection delay = 21.8 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	90.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	27.6	21.7	0.00	0.0	0.0	22.2

	0.0						0.0	
R	0.0	0.00	27.6	26.2	0.00	0.0	0.0	37.5
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	22.8	20.2	0.00	0.0	0.0	23.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	22.8	16.7	0.00	0.0	0.0	17.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+

Intersection Delay 21.8 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	386	555			795	326	573	263
So	1900	1900			1900	1900	1900	1900
No.Lanes	3 0 2		0 0 0		0 3	1	0 3	1
SL	1769	1584			1862	1583	1862	1583
LnCapacity	682	610			918	1583	918	1583
Flow Ratio	0.2	0.4			0.4	0.2	0.3	0.2
v/c Ratio	0.57	0.91			0.87	0.21	0.62	0.17
Grn Ratio	0.39	0.39			0.49	1.00	0.49	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	7.6	13.1			17.6		10.5	
kB	0.5	0.5			0.7	0.9	0.7	0.9
Q2	0.7	3.4			3.5	0.2	1.1	0.2
Q Average	8.3	16.6			21.0		11.6	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	9.8	19.3			24.4		13.6	
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5			1.4		1.5	
BOQ	12.7	24.4			30.5		17.4	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.6			1.5		1.6	
BOQ	13.8	26.1			32.4		18.8	
QSRatio								
95th Percentile Output:								
fB%	1.9	1.7			1.7		1.8	
BOQ	15.6	28.8			35.5		21.0	
QSRatio								
98th Percentile Output:								
fB%	2.2	2.0			1.9		2.1	
BOQ	18.5	32.8			39.9		24.4	
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 NB Ramps

Inter.: Jamboree at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	0	4	1	0	4	1
LGConfig				L	LTR	R		T	R		T	R
Volume				1135	0	516		1284	670		1915	470
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		51.9	0.0			16.2	6.7	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1021	1770	1.17	0.58	106.4	F		
LTR	1074	1863	0.00	0.58	8.1	A	77.3	E
R	913	1583	0.59	0.58	13.3	B		
Northbound								
T	2120	6765	0.64	0.31	27.2	C	17.9	B
R	1583	1583	0.45	1.00	0.2	A		
Southbound								
T	2120	6765	0.95	0.31	40.6	D	32.6	C
R	1583	1583	0.31	1.00	0.1	A		

Intersection Delay = 40.1 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-5 NB Ramps
Area Type:	All other areas

Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1135	0	516		1284	670		1915	470
% Heavy Veh				2	2	2		2	2		2	2
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
PK 15 Vol				299	0	136		338	176		504	124
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0		12.0	12.0
RTOR Vol						0				0			0
Adj Flow				1195	0	543			1352	705		2016	495
%InSharedLn				0		0							
Prop LTs					0.000				0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000	
Peds Bikes	0				0			0			0		
Buses				0	0	0			0	0		0	0
%InProtPhase													

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0		0.0	0.0
Arriv. Type				3	3	3		3	3		3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		51.9	0.0			16.2	6.7	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1135	0	516		1284	670		1915	470
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
Adj flow				1195	0	543		1352	705		2016	495
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
Lane group				L		LTR	R		T	R		T	R
Adj flow				1195	0	543		1352	705		2016	495	

Prop LTs			0.000			0.000			0.000		
Prop RTs			0.000	1.000		0.000	1.000		0.000	1.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG				L	LTR	R		T	R		T	R
So				1900	1900	1900		1900	1900		1900	1900
Lanes	0	0	0	1	1	1	0	4	1	0	4	1
fW				1.000	1.000	1.000		1.000	1.000		1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980		0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000		1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000		1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000		1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000		1.000	1.000
fLU				1.000	1.000	1.000		0.908	1.000		0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000			1.000	
Sec.												
fLpb				1.000	1.000			1.000			1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				1770	1863	1583		6765	1583		6765	1583
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	1195	1770	#	0.68	0.58	1021	1.17
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.58	1074	0.00
Right	R	543	1583		0.34	0.58	913	0.59
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1352	6765		0.20	0.31	2120	0.64
Right	R	705	1583		0.45	1.00	1583	0.45
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2016	6765	#	0.30	0.31	2120	0.95
Right	R	495	1583		0.31	1.00	1583	0.31

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.97
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.09

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor Del k	d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.17	0.58	19.0	1.000	1021	0.50	87.3	0.0	106.4	F		
LTR	0.00	0.58	8.1	1.000	1074	0.11	0.0	0.0	8.1	A	77.3	E
R	0.59	0.58	12.3	1.000	913	0.18	1.1	0.0	13.3	B		
Northbound												
T	0.64	0.31	26.5	1.000	2120	0.22	0.6	0.0	27.2	C	17.9	B

R	0.45	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A	
Southbound											
T	0.95	0.31	30.2	1.000	2120	0.46	10.3	0.0	40.6	D	32.6 C
R	0.31	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A	

Intersection delay = 40.1 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				

PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 90.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec

Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.0	19.0	0.00	43.5	0.0	106.4
LTR	0.0	0.00	19.0	8.1	0.00	0.0	0.0	8.1
R	0.0	0.00	19.0	12.3	0.00	0.0	0.0	13.3
Northbound								
	0.0						0.0	
T	0.0	0.00	30.9	26.5	0.00	0.0	0.0	27.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	30.9	30.2	0.00	0.0	0.0	40.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 40.1 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	LTR	R	T	R		T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate				1195	0	543	372	705		555	495	
So				1900	1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0	1	1	1	0 4	1	0	4	1	
SL				1770	1863	1583	1862	1583		1862	1583	
LnCapacity				1021	1074	913	583	1583		583	1583	
Flow Ratio				0.7	0.0	0.3	0.2	0.4		0.3	0.3	
v/c Ratio				1.17	0.00	0.59	0.64	0.45		0.95	0.31	
Grn Ratio				0.58	0.58	0.58	0.31	1.00		0.31	1.00	
I Factor					1.000		1.000			1.000		
AT or PVG				3	3	3	3	3		3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
PF2				1.00	1.00	1.00	1.00			1.00		
Q1				29.9	0.0	8.7	8.0			13.6		
kB				0.7	0.7	0.7	0.5	0.9		0.5	0.9	
Q2				25.8	0.0	0.9	0.9	0.7		4.4	0.4	
Q Average				55.7	0.0	9.7	8.8			18.0		
Q Spacing				25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage				0	0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.1	1.2	1.2	1.2			1.2		
BOQ				62.6	0.0	11.4	10.4			20.9		
QSRatio												
85th Percentile Output:												
fB%				1.3	1.6	1.5	1.5			1.5		
BOQ				75.0	0.0	14.7	13.5			26.3		
QSRatio												
90th Percentile Output:												
fB%				1.4	1.8	1.6	1.7			1.6		
BOQ				79.3	0.0	15.9	14.6			28.1		
QSRatio												
95th Percentile Output:												
fB%				1.5	2.1	1.9	1.9			1.7		
BOQ				85.0	0.0	17.9	16.5			30.9		
QSRatio												
98th Percentile Output:												
fB%				1.7	2.7	2.2	2.2			2.0		
BOQ				95.4	0.0	21.1	19.5			35.1		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 NB Ramps

Inter.: Jamboree at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Volume				377	0		998		2632	710		1713	480
Lane Width				12.0	12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol							0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	46.2	0.0				13.4	20.3	0.0
Yellow	3.6					4.3	4.3	
All Red	1.0					1.0	1.0	

Cycle Length: 95.1 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
Westbound								
L	860	1770	0.46	0.49	16.6	B		
LTR	905	1863	0.00	0.49	12.6	B	148.1	F
R	769	1583	1.37	0.49	197.8	F		
Northbound								
T	2774	6765	1.00	0.41	44.9	D	35.4	D
R	1583	1583	0.47	1.00	0.2	A		
Southbound								
T	2774	6765	0.65	0.41	23.1	C	18.1	B
R	1583	1583	0.32	1.00	0.1	A		

Intersection Delay = 52.3 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Jamboree at I-5 NB Ramps

Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				377	0	998		2632	710		1713	480
% Heavy Veh				2	2	2		2	2		2	2
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
PK 15 Vol				99	0	263		693	187		451	126
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0		12.0	12.0
RTOR Vol						0				0			0
Adj Flow				397	0	1051		2771	747		1803	505
%InSharedLn				0		0							
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0		0.0	0.0
Arriv. Type				3	3	3		3	3		3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		46.2	0.0			13.4	20.3	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 95.1 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				377	0	998		2632	710		1713	480
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
Adj flow				397	0	1051		2771	747		1803	505
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
Lane group				L		LTR	R		T	R		T	R

| | | |

T	1.00	0.41	28.0	1.000	2774	0.50	16.8	0.0	44.9	D	35.4	D
R	0.47	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												
T	0.65	0.41	22.6	1.000	2774	0.23	0.5	0.0	23.1	C	18.1	B
R	0.32	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 52.3 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.1 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.1 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					

n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.1 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane	Initial Unmet Demand	Dur. Unmet Demand	Uniform Delay Unadj.	Uniform Delay Adj.	Initial Queue Param.	Final Unmet Demand	Initial Queue Delay	Lane Group Delay

Group	Q veh	t hrs.	ds	d1 sec	u	Q veh	d3 sec	d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	24.5	16.2	0.00	0.0	0.0	16.6
LTR	0.0	0.00	24.5	12.6	0.00	0.0	0.0	12.6
R	0.0	0.00	24.5	24.5	0.00	70.5	0.0	197.8
Northbound								
	0.0						0.0	
T	0.0	0.00	28.1	28.0	0.00	0.0	0.0	44.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	28.1	22.6	0.00	0.0	0.0	23.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 52.3 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	LTR	R	T	R		T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate				397	0	1051	762	747		496	505	
So				1900	1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0	1	1	1	0 4	1		0 4	1	
SL				1770	1863	1583	1862	1583		1862	1583	
LnCapacity				860	905	769	763	1583		763	1583	
Flow Ratio				0.2	0.0	0.7	0.4	0.5		0.3	0.3	
v/c Ratio				0.46	0.00	1.37	1.00	0.47		0.65	0.32	
Grn Ratio				0.49	0.49	0.49	0.41	1.00		0.41	1.00	
I Factor					1.000		1.000			1.000		
AT or PVG				3	3	3	3	3		3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
PF2				1.00	1.00	1.00	1.00			1.00		
Q1				7.0	0.0	27.8	20.1			10.5		
kB				0.7	0.7	0.6	0.6	0.9		0.6	0.9	
Q2				0.6	0.0	37.4	7.5	0.8		1.1	0.4	
Q Average				7.5	0.0	65.2	27.6			11.6		
Q Spacing				25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage				0	0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.2	1.2	1.1	1.2			1.2		
BOQ				8.9	0.0	72.9	31.8			13.7		
QSRatio												
85th Percentile Output:												
fB%				1.5	1.6	1.3	1.4			1.5		
BOQ				11.5	0.0	86.9	39.2			17.5		
QSRatio												
90th Percentile Output:												
fB%				1.7	1.8	1.4	1.5			1.6		
BOQ				12.6	0.0	92.2	41.5			18.9		
QSRatio												
95th Percentile Output:												
fB%				1.9	2.1	1.5	1.6			1.8		
BOQ				14.2	0.0	98.8	45.0			21.1		
QSRatio												
98th Percentile Output:												
fB%				2.3	2.7	1.7	1.8			2.1		
BOQ				17.0	0.0	111	50.3			24.5		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps

Inter.: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Volume	452		978					1495	379		2271	625
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	24.4	0.0				7.8	12.6	0.0	
Yellow	3.6					4.3	4.3		
All Red	1.0					1.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1398	3437	0.34	0.41	12.4	B		
							22.2	C
R	1140	2803	0.90	0.41	26.8	C		
Westbound								
Northbound								
T	2898	6765	0.54	0.43	13.0	B	10.4	B
R	1583	1583	0.25	1.00	0.1	A		
Southbound								
T	2898	6765	0.83	0.43	17.2	B	13.6	B
R	1583	1583	0.42	1.00	0.2	A		

Intersection Delay = 14.6 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09

Analysis Time Period: AM Peak Hour
Intersection: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	452		978					1495	379		2271	625
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	119		257					393	100		598	164
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	476		1029					1574	399		2391	658
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A							
Thru								
Right	A							
Peds								
WB Left								
Thru								
Right								
Peds								
NB Left								
Thru					A		A	
Right					A		A	
Peds								
SB Left								
Thru					A		A	
Right					A		A	
Peds								
NB Right	A							
SB Right	A							
EB Right								
WB Right								
Green	24.4	0.0			7.8	12.6	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	452		978					1495	379		2271	625
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	476		1029					1574	399		2391	658

No. Lanes		2	0	2		0	0	0		0	4	1		0	4	1	
Lane group	L			R							T	R			T	R	
Adj flow	476			1029							1574	399			2391	658	
Prop LTs											0.000				0.000		
Prop RTs				1.000						0.000	1.000			0.000	1.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound				Northbound				Southbound			
LG	L			R								T		R		T		R	
So	1900			1900								1900		1900		1900		1900	
Lanes	2		0	2		0	0		0	0		4		1	0	4		1	
fW	1.000			1.000								1.000		1.000		1.000		1.000	
fHV	0.980			0.980								0.980		0.980		0.980		0.980	
fG	1.000			1.000								1.000		1.000		1.000		1.000	
fP	1.000			1.000								1.000		1.000		1.000		1.000	
fBB	1.000			1.000								1.000		1.000		1.000		1.000	
fA	1.000			1.000								1.000		1.000		1.000		1.000	
fLU	0.971			0.885								0.908		1.000		0.908		1.000	
fRT				0.850								1.000		0.850		1.000		0.850	
fLT	0.950											1.000				1.000			
Sec.																			
fLpb	1.000											1.000				1.000			
fRpb				1.000								1.000		1.000		1.000		1.000	
S	3437			2803								6765		1583		6765		1583	
Sec.																			

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	476	3437		0.14	0.41	1398	0.34
Prot								
Perm								
Thru								
Right	R	1029	2803	#	0.37	0.41	1140	0.90
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1574	6765		0.23	0.43	2898	0.54
Right	R	399	1583		0.25	1.00	1583	0.25
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2391	6765	#	0.35	0.43	2898	0.83
Right	R	658	1583		0.42	1.00	1583	0.42

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.72
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.86

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.34	0.41	12.3	1.000	1398	0.11	0.1	0.0	12.4	B		
											22.2	C
R	0.90	0.41	16.7	1.000	1140	0.42	10.1	0.0	26.8	C		
Westbound												

Northbound

T	0.54	0.43	12.8	1.000	2898	0.14	0.2	0.0	13.0	B	10.4	B
R	0.25	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Southbound

T	0.83	0.43	15.2	1.000	2898	0.36	2.1	0.0	17.2	B	13.6	B
R	0.42	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 14.6 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				

gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Initial Dur.	Uniform Delay	Initial Final	Initial Lane

Appr/ Lane Group	Unmet Demand Q veh	Unmet Demand t hrs.	Unadj. ds	Adj. d1 sec	Queue Param. u	Unmet Demand Q veh	Queue Delay d3 sec	Group Delay d sec
Eastbound								
L	0.0	0.00	17.8	12.3	0.00	0.0	0.0	12.4
	0.0						0.0	
R	0.0	0.00	17.8	16.7	0.00	0.0	0.0	26.8
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	17.1	12.8	0.00	0.0	0.0	13.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	17.1	15.2	0.00	0.0	0.0	17.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 14.6 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	245	581			433	399	658	658
So	1900	1900			1900	1900	1900	1900
No.Lanes	2 0 2		0 0 0		4	1	4	1
SL	1770	1584			1862	1583	1862	1583
LnCapacity	719	644			797	1583	797	1583
Flow Ratio	0.1	0.4			0.2	0.3	0.4	0.4
v/c Ratio	0.34	0.90			0.54	0.25	0.83	0.42
Grn Ratio	0.41	0.41			0.43	1.00	0.43	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	2.8	9.1			5.4		9.7	
kB	0.4	0.4			0.5	0.7	0.5	0.7
Q2	0.2	2.8			0.6	0.2	2.0	0.5
Q Average	3.0	11.9			5.9		11.7	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	3.6	14.0			7.0		13.7	
QSRatio								
85th Percentile Output:								
fB%	1.6	1.5			1.5		1.5	
BOQ	4.8	17.9			9.2		17.6	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.6			1.7		1.6	
BOQ	5.3	19.3			10.1		19.0	
QSRatio								
95th Percentile Output:								
fB%	2.0	1.8			1.9		1.8	
BOQ	6.1	21.5			11.5		21.2	
QSRatio								
98th Percentile Output:								
fB%	2.5	2.1			2.3		2.1	
BOQ	7.6	25.0			13.8		24.7	
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps

Inter.: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Volume	695		794					2560	1092		1579	511
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	A				NB	Left				
	Thru						Thru	A	A		
	Right	A					Right	A	A		
	Peds						Peds				
WB	Left					SB	Left				
	Thru						Thru	A	A		
	Right						Right	A	A		
	Peds						Peds				
NB	Right	A				EB	Right				
SB	Right	A				WB	Right				
Green		20.2	0.0					17.5	7.1	0.0	
Yellow		3.6						4.3	4.3		
All Red		1.0						1.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1157	3437	0.63	0.34	17.9	B		
							23.8	C
R	944	2803	0.89	0.34	28.9	C		
Westbound								
Northbound								
T	3371	6765	0.80	0.50	14.0	B	10.3	B
R	1583	1583	0.73	1.00	1.7	A		
Southbound								
T	3371	6765	0.49	0.50	10.1	B	7.7	A
R	1583	1583	0.34	1.00	0.1	A		

Intersection Delay = 12.3 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB

Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	695		794					2560	1092		1579	511
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	183		209					674	287		416	134
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	732		836					2695	1149		1662	538
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	20.2	0.0			17.5	7.1	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	695		794					2560	1092		1579	511

| | | |

Northbound

T	0.80	0.50	12.6	1.000	3371	0.34	1.4	0.0	14.0	B	10.3	B
R	0.73	1.00	0.0	0.950	1583	0.29	1.7	0.0	1.7	A		

Southbound

T	0.49	0.50	10.0	1.000	3371	0.11	0.1	0.0	10.1	B	7.7	A
R	0.34	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 12.3 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT				0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					

Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	19.9	16.8	0.00	0.0	0.0	17.9
	0.0						0.0	
R	0.0	0.00	19.9	18.8	0.00	0.0	0.0	28.9
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	15.0	12.6	0.00	0.0	0.0	14.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.7
Southbound								
	0.0						0.0	
T	0.0	0.00	15.0	10.0	0.00	0.0	0.0	10.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 12.3 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	376	472			742	1149	457	538
So	1900	1900			1900	1900	1900	1900
No.Lanes	2 0	2	0 0	0	4	1	4	1
SL	1770	1584			1862	1583	1862	1583
LnCapacity	595	533			928	1583	928	1583
Flow Ratio	0.2	0.3			0.4	0.7	0.2	0.3
v/c Ratio	0.63	0.89			0.80	0.73	0.49	0.34
Grn Ratio	0.34	0.34			0.50	1.00	0.50	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	5.3	7.4			10.3		5.1	
kB	0.4	0.4			0.5	0.7	0.5	0.7
Q2	0.7	2.2			1.9	1.8	0.5	0.4
Q Average	5.9	9.7			12.2		5.6	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	7.1	11.4			14.3		6.6	
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5			1.5		1.5	
BOQ	9.2	14.7			18.3		8.6	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.6			1.6		1.7	
BOQ	10.1	15.9			19.8		9.5	
QSRatio								
95th Percentile Output:								
fB%	1.9	1.9			1.8		1.9	
BOQ	11.5	17.9			22.0		10.8	
QSRatio								
98th Percentile Output:								
fB%	2.3	2.2			2.1		2.4	
BOQ	13.9	21.0			25.5		13.1	
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 NB Ramps

Inter.: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L	LTR	R				L	T			T	R
Volume	141	0	440				330	909			2520	40
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right	A				WB Right				
Green	28.4	0.0				13.0	55.7	7.0	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 125.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	402	1770	0.37	0.23	41.3	D		
LTR	423	1863	0.00	0.23	37.3	D	159.0	F
R	360	1583	1.29	0.23	196.6	F		
Westbound								
Northbound								
L	357	3437	0.97	0.10	95.9	F		
T	3479	5074	0.28	0.69	7.7	A	31.1	C
Southbound								
T	2781	5074	0.95	0.55	35.5	D	35.0-	C
R	1583	1583	0.03	1.00	0.0+	A		

Intersection Delay = 50.3 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 NB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	141	0	440				330	909			2520	40
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	37	0	116				87	239			663	11
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L	LTR	R				L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	148	0	463				347	957			2653	42
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right	A				WB Right			
Green	28.4	0.0				13.0	55.7	7.0 0.0
Yellow	3.6					3.2	4.3	4.3
All Red	1.5					1.0	1.5	1.5

Cycle Length: 125.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R

Volume, V	141	0	440						330	909				2520	40				
PHF	0.95	0.95	0.95						0.95	0.95				0.95	0.95				
Adj flow	148	0	463						347	957				2653	42				
No. Lanes		1	1	1		0	0	0		2	3	0		0	3	1			
Lane group	L		LTR	R					L		T				T		R		
Adj flow	148	0	463						347	957				2653	42				
Prop LTs		0.000								0.000				0.000					
Prop RTs		0.000	1.000							0.000				0.000	1.000				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound						Westbound						Northbound						Southbound					
LG	L		LTR	R									L		T					T		R		
So	1900		1900	1900									1900		1900					1900		1900		
Lanes	1		1		0		0		0				2		3		0		0	3		1		
fW	1.000		1.000	1.000									1.000		1.000					1.000		1.000		
fHV	0.980		0.980	0.980									0.980		0.980					0.980		0.980		
fG	1.000		1.000	1.000									1.000		1.000					1.000		1.000		
fP	1.000		1.000	1.000									1.000		1.000					1.000		1.000		
fBB	1.000		1.000	1.000									1.000		1.000					1.000		1.000		
fA	1.000		1.000	1.000									1.000		1.000					1.000		1.000		
fLU	1.000		1.000	1.000									0.971		0.908					0.908		1.000		
fRT			1.000	0.850											1.000					1.000		0.850		
fLT	0.950		1.000										0.950		1.000					1.000				
Sec.																								
fLpb	1.000		1.000										1.000		1.000					1.000				
fRpb			1.000	1.000											1.000					1.000		1.000		
S	1770		1863	1583									3437		5074					5074		1583		
Sec.																								

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	148	1770		0.08	0.23	402	0.37
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.23	423	0.00
Right	R	463	1583	#	0.29	0.23	360	1.29
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	347	3437	#	0.10	0.10	357	0.97
Prot								
Perm								
Thru	T	957	5074		0.19	0.69	3479	0.28
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2653	5074	#	0.52	0.55	2781	0.95
Right	R	42	1583		0.03	1.00	1583	0.03

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.92
Total lost time per cycle, L = 15.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.04

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.37	0.23	40.7	1.000	402	0.11	0.6	0.0	41.3	D		
LTR	0.00	0.23	37.3	1.000	423	0.11	0.0	0.0	37.3	D	159.0	F
R	1.29	0.23	48.3	1.000	360	0.50	148.3	0.0	196.6	F		

Westbound

Northbound

L	0.97	0.10	55.8	1.000	357	0.48	40.1	0.0	95.9	F		
T	0.28	0.69	7.6	1.000	3479	0.11	0.0	0.0	7.7	A	31.1	C

Southbound

T	0.95	0.55	26.8	1.000	2781	0.46	8.8	0.0	35.5	D	35.0-	C
R	0.03	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		

Intersection delay = 50.3 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	125.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	125.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908

Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 125.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	48.3	40.7	0.00	0.0	0.0	41.3
LTR	0.0	0.00	48.3	37.3	0.00	0.0	0.0	37.3
R	0.0	0.00	48.3	48.3	0.00	25.8	0.0	196.6
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	56.0	55.8	0.00	0.0	0.0	95.9
T	0.0	0.00	19.7	7.6	0.00	0.0	0.0	7.7
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	28.3	26.8	0.00	0.0	0.0	35.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+

Intersection Delay 50.3 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

LaneGroup	Eastbound L	Eastbound LTR	Eastbound R	Westbound	Northbound L	Northbound T	Southbound T	Southbound R
Init Queue	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Flow Rate	148	0	463		178	351	973	42
So	1900	1900	1900		1900	1900	1900	1900
No.Lanes	1	1	1	0 0 0	2	3 0	3	1
SL	1770	1863	1583		1770	1862	1862	1583
LnCapacity	402	423	360		183	1277	1020	1583
Flow Ratio	0.1	0.0	0.3		0.1	0.2	0.5	0.0
v/c Ratio	0.37	0.00	1.29		0.97	0.27	0.95	0.03
Grn Ratio	0.23	0.23	0.23		0.10	0.69	0.55	1.00
I Factor		1.000				1.000	1.000	
AT or PVG	3	3	3		3	3	3	3
Pltn Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00		1.00	1.00	1.00	
Q1	4.3	0.0	16.1		6.2	4.7	32.0	
kB	0.5	0.5	0.5		0.3	1.0	0.9	1.1
Q2	0.3	0.0	14.7		2.3	0.4	7.6	0.0
Q Average	4.6	0.0	30.7		8.5	5.1	39.6	
Q Spacing	25.0	25.0	25.0		25.0	25.0	25.0	25.0
Q Storage	0	0	0		0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2	1.1		1.2	1.2	1.1	
BOQ	5.5	0.0	35.2		10.0	6.0	45.1	
QSRatio								
85th Percentile Output:								
fB%	1.6	1.6	1.4		1.5	1.6	1.4	
BOQ	7.2	0.0	43.3		12.9	7.9	54.7	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.8	1.5		1.7	1.7	1.5	
BOQ	7.9	0.0	45.7		14.1	8.7	57.7	
QSRatio								
95th Percentile Output:								
fB%	2.0	2.1	1.6		1.9	2.0	1.6	
BOQ	9.1	0.0	49.5		15.9	9.9	62.1	
QSRatio								
98th Percentile Output:								
fB%	2.4	2.7	1.8		2.2	2.4	1.7	
BOQ	11.1	0.0	55.2		18.8	12.1	69.3	
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 NB Ramps

Inter.: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L	LTR	R				L	T			T	R
Volume	312	0	281				671	1608			979	449
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right	A				WB Right			
Green	14.0	0.0				15.4	5.1	4.6	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	413	1770	0.79	0.23	31.9	C		
LTR	435	1863	0.00	0.23	17.6	B	32.8	C
R	369	1583	0.80	0.23	33.7	C		
Westbound								
Northbound								
L	882	3437	0.80	0.26	26.2	C		
T	2968	5074	0.57	0.59	8.0	A	13.4	B
Southbound								
T	1311	5074	0.79	0.26	24.0	C	16.5	B
R	1583	1583	0.30	1.00	0.1	A		

Intersection Delay = 17.1 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 NB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	312	0	281				671	1608			979	449
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	82	0	74				177	423			258	118
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L	LTR	R				L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	328	0	296				706	1693			1031	473
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right	A				WB Right			
Green	14.0	0.0				15.4	5.1	4.6	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R

Volume, V	312	0	281						671	1608					979	449							
PHF	0.95	0.95	0.95						0.95	0.95					0.95	0.95							
Adj flow	328	0	296						706	1693					1031	473							
No. Lanes	1	1	1		0	0	0		2	3	0				0	3	1						
Lane group	L		LTR	R					L	T						T	R						
Adj flow	328	0	296						706	1693					1031	473							
Prop LTs		0.000								0.000						0.000							
Prop RTs		0.000	1.000							0.000					0.000	1.000							

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound						Westbound						Northbound						Southbound					
LG	L		LTR	R									L	T						T	R			
So	1900		1900	1900									1900	1900						1900	1900			
Lanes	1		1		0		0		0				2	3		0		0		3	1			
fW	1.000		1.000	1.000									1.000	1.000						1.000	1.000			
fHV	0.980		0.980	0.980									0.980	0.980						0.980	0.980			
fG	1.000		1.000	1.000									1.000	1.000						1.000	1.000			
fP	1.000		1.000	1.000									1.000	1.000						1.000	1.000			
fBB	1.000		1.000	1.000									1.000	1.000						1.000	1.000			
fA	1.000		1.000	1.000									1.000	1.000						1.000	1.000			
fLU	1.000		1.000	1.000									0.971	0.908						0.908	1.000			
fRT			1.000	0.850										1.000						1.000	0.850			
fLT	0.950		1.000										0.950	1.000						1.000				
Sec.																								
fLpb	1.000		1.000										1.000	1.000						1.000				
fRpb			1.000	1.000										1.000						1.000	1.000			
S	1770		1863	1583									3437	5074						5074	1583			
Sec.																								

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	328	1770		0.19	0.23	413	0.79
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.23	435	0.00
Right	R	296	1583	#	0.19	0.23	369	0.80
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	706	3437	#	0.21	0.26	882	0.80
Prot								
Perm								
Thru	T	1693	5074		0.33	0.59	2968	0.57
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1031	5074	#	0.20	0.26	1311	0.79
Right	R	473	1583		0.30	1.00	1583	0.30

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.60
Total lost time per cycle, L = 15.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.80

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Del Factor k	d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.79	0.23	21.6	1.000	413	0.34	10.3	0.0	31.9	C		
LTR	0.00	0.23	17.6	1.000	435	0.11	0.0	0.0	17.6	B	32.8	C
R	0.80	0.23	21.7	1.000	369	0.35	12.0	0.0	33.7	C		

Westbound

Northbound

L	0.80	0.26	20.9	1.000	882	0.34	5.3	0.0	26.2	C		
T	0.57	0.59	7.8	1.000	2968	0.16	0.3	0.0	8.0	A	13.4	B

Southbound

T	0.79	0.26	20.7	1.000	1311	0.33	3.3	0.0	24.0	C	16.5	B
R	0.30	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 17.1 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908

Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				

Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	23.0	21.6	0.00	0.0	0.0	31.9
LTR	0.0	0.00	23.0	17.6	0.00	0.0	0.0	17.6
R	0.0	0.00	23.0	21.7	0.00	0.0	0.0	33.7
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	22.3	20.9	0.00	0.0	0.0	26.2
T	0.0	0.00	12.4	7.8	0.00	0.0	0.0	8.0
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	22.2	20.7	0.00	0.0	0.0	24.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 17.1 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	328	0	296				363	621		378	473	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	413	435	369				454	1089		481	1583	
Flow Ratio	0.2	0.0	0.2				0.2	0.3		0.2	0.3	
v/c Ratio	0.79	0.00	0.80				0.80	0.57		0.79	0.30	
Grn Ratio	0.23	0.23	0.23				0.26	0.59		0.26	1.00	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00		
Q1	5.1	0.0	4.7				5.7	6.4		5.9		
kB	0.3	0.3	0.3				0.3	0.6		0.3	0.7	
Q2	1.1	0.0	1.1				1.2	0.7		1.2	0.3	
Q Average	6.3	0.0	5.7				6.9	7.2		7.0		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.2		
BOQ	7.4	0.0	6.8				8.1	8.5		8.3		
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6	1.5				1.5	1.5		1.5		
BOQ	9.7	0.0	8.9				10.6	11.0		10.8		
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8	1.7				1.7	1.7		1.7		
BOQ	10.6	0.0	9.7				11.6	12.1		11.8		
QSRatio												
95th Percentile Output:												
fB%	1.9	2.1	1.9				1.9	1.9		1.9		
BOQ	12.0	0.0	11.1				13.1	13.7		13.4		
QSRatio												
98th Percentile Output:												
fB%	2.3	2.7	2.3				2.3	2.3		2.3		
BOQ	14.5	0.0	13.4				15.7	16.4		16.1		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: Pb
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps

Inter.: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	703	0	856				160	937			2394	570
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	51.6	0.0				5.3	41.9	15.8	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 132.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	692	1770	1.07	0.39	94.5	F		
LTR	728	1863	0.00	0.39	24.5	C	182.1	F
R	619	1583	1.46	0.39	254.1	F		
Westbound								
Northbound								
L	138	3437	1.22	0.04	209.9	F		
T	2748	5074	0.36	0.54	17.3	B	45.3	D
Southbound								
T	2402	5074	1.05	0.47	67.6	E	61.5	E
R	750	1583	0.80	0.47	35.6	D		

Intersection Delay = 91.8 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: Pb
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	703	0	856				160	937			2394	570
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	185	0	225				42	247			630	150
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L	LTR	R				L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	740	0	901				168	986			2520	600
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A							
EB Thru	A							
EB Right	A							
EB Peds								
WB Left								
WB Thru								
WB Right								
WB Peds								
NB Right								
SB Right								
NB Left					A			
NB Thru					A	A	A	
NB Right								
NB Peds								
SB Left								
SB Thru						A	A	
SB Right						A	A	
SB Peds								
EB Right								
WB Right								
Green	51.6	0.0			5.3	41.9	15.8	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	0.5				0.5	0.5	0.5	

Cycle Length: 132.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R

Volume, V	703	0	856						160	937					2394	570			
PHF	0.95	0.95	0.95						0.95	0.95					0.95	0.95			
Adj flow	740	0	901						168	986					2520	600			
No. Lanes		1	1	1		0	0	0		2	3	0		0	3	1			
Lane group	L		LTR	R					L		T				T		R		
Adj flow	740	0	901						168	986					2520	600			
Prop LTs		0.000								0.000					0.000				
Prop RTs		0.000	1.000							0.000					0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound						Westbound						Northbound						Southbound		
LG	L		LTR	R									L		T				T		R
So	1900		1900	1900									1900		1900				1900		1900
Lanes	1		1		0		0		0				2		3		0		3		1
fW	1.000		1.000	1.000									1.000		1.000				1.000		1.000
fHV	0.980		0.980	0.980									0.980		0.980				0.980		0.980
fG	1.000		1.000	1.000									1.000		1.000				1.000		1.000
fP	1.000		1.000	1.000									1.000		1.000				1.000		1.000
fBB	1.000		1.000	1.000									1.000		1.000				1.000		1.000
fA	1.000		1.000	1.000									1.000		1.000				1.000		1.000
fLU	1.000		1.000	1.000									0.971		0.908				0.908		1.000
fRT			1.000	0.850											1.000				1.000		0.850
fLT	0.950		1.000										0.950		1.000				1.000		
Sec.																					
fLpb	1.000		1.000										1.000		1.000				1.000		
fRpb			1.000	1.000											1.000				1.000		1.000
S	1770		1863	1583									3437		5074				5074		1583
Sec.																					

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	740	1770		0.42	0.39	692	1.07
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.39	728	0.00
Right	R	901	1583	#	0.57	0.39	619	1.46
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	168	3437	#	0.05	0.04	138	1.22
Prot								
Perm								
Thru	T	986	5074		0.19	0.54	2748	0.36
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2520	5074	#	0.50	0.47	2402	1.05
Right	R	600	1583		0.38	0.47	750	0.80

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.11
Total lost time per cycle, L = 12.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.23

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.07	0.39	40.2	1.000	692	0.50	54.3	0.0	94.5	F		
LTR	0.00	0.39	24.5	1.000	728	0.11	0.0	0.0	24.5	C	182.1	F
R	1.46	0.39	40.2	1.000	619	0.50	213.9	0.0	254.1	F		

Westbound

Northbound

L	1.22	0.04	63.3	1.000	138	0.50	146.6	0.0	209.9	F		
T	0.36	0.54	17.2	1.000	2748	0.11	0.1	0.0	17.3	B	45.3	D

Southbound

T	1.05	0.47	34.8	1.000	2402	0.50	32.9	0.0	67.6	E	61.5	E
R	0.80	0.47	29.5	1.000	750	0.34	6.2	0.0	35.6	D		

Intersection delay = 91.8 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	132.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	132.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908

Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 132.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	40.2	40.2	0.00	12.0	0.0	94.5
LTR	0.0	0.00	40.2	24.5	0.00	0.0	0.0	24.5
R	0.0	0.00	40.2	40.2	0.00	70.5	0.0	254.1
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	63.3	63.3	0.00	7.5	0.0	209.9
T	0.0	0.00	30.2	17.2	0.00	0.0	0.0	17.3
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	34.8	34.8	0.00	29.5	0.0	67.6
R	0.0	0.00	34.8	29.5	0.00	0.0	0.0	35.6

Intersection Delay 91.8 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

LaneGroup	Eastbound L	Eastbound LTR	Eastbound R	Westbound	Northbound L	Northbound T	Southbound T	Southbound R
Init Queue	0.0	0.0	0.0		0.0	0.0	0.0	0.0
Flow Rate	740	0	901		86	361	925	600
So	1900	1900	1900		1900	1900	1900	1900
No.Lanes	1	1	1	0 0 0	2	3 0	3	1
SL	1770	1863	1583		1770	1862	1862	1583
LnCapacity	692	728	619		71	1008	881	750
Flow Ratio	0.4	0.0	0.6		0.0	0.2	0.5	0.4
v/c Ratio	1.07	0.00	1.46		1.21	0.36	1.05	0.80
Grn Ratio	0.39	0.39	0.39		0.04	0.54	0.47	0.47
I Factor		1.000				1.000	1.000	
AT or PVG	3	3	3		3	3	3	3
Pltn Ratio	1.00	1.00	1.00		1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00		1.00	1.00	1.00	1.00
Q1	27.1	0.0	33.0		3.2	7.5	33.9	18.6
kB	0.7	0.7	0.7		0.2	0.9	0.8	0.7
Q2	11.6	0.0	37.2		2.6	0.5	12.8	2.6
Q Average	38.7	0.0	70.3		5.8	8.0	46.7	21.2
Q Spacing	25.0	25.0	25.0		25.0	25.0	25.0	25.0
Q Storage	0	0	0		0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.1	1.2	1.1		1.2	1.2	1.1	1.2
BOQ	44.0	0.0	78.5		6.8	9.5	52.8	24.6
QSRatio								
85th Percentile Output:								
fB%	1.4	1.6	1.3		1.5	1.5	1.4	1.4
BOQ	53.5	0.0	93.4		8.9	12.3	63.7	30.7
QSRatio								
90th Percentile Output:								
fB%	1.5	1.8	1.4		1.7	1.7	1.4	1.5
BOQ	56.4	0.0	99.2		9.8	13.4	67.2	32.6
QSRatio								
95th Percentile Output:								
fB%	1.6	2.1	1.5		1.9	1.9	1.5	1.7
BOQ	60.8	0.0	106		11.2	15.1	72.1	35.7
QSRatio								
98th Percentile Output:								
fB%	1.8	2.7	1.7		2.3	2.2	1.7	1.9
BOQ	67.8	0.0	120		13.5	17.9	80.7	40.2
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps

Inter.: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	577	0	505				255	1826			958	320
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	22.1	0.0				6.2	5.8	5.5	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 57.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
L	686	1770	0.88	0.39	29.4	C		
LTR	722	1863	0.00	0.39	10.7	B	29.0	C
R	614	1583	0.87	0.39	28.6	C		
Westbound								
Northbound								
L	374	3437	0.72	0.11	31.0	C		
T	2314	5074	0.83	0.46	16.3	B	18.1	B
Southbound								
T	1433	5074	0.70	0.28	19.9	B	21.4	C
R	447	1583	0.75	0.28	25.8	C		

Intersection Delay = 21.7 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Tustin Ranch at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	577	0	505				255	1826			958	320
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	152	0	133				67	481			252	84
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0								0	
Adj Flow	607	0	532				268	1922			1008	337
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	22.1	0.0				6.2	5.8	5.5	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 57.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	577	0	505				255	1826			958	320
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	607	0	532				268	1922			1008	337
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	607	0	532				268	1922			1008	337
Prop LTs	0.000						0.000			0.000		
Prop RTs	0.000		1.000				0.000			0.000		1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound	
LG	L	LTR	R				L	T		T	R
So	1900	1900	1900				1900	1900		1900	1900
Lanes	1	1	1	0	0	0	2	3	0	3	1
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000
fRT		1.000	0.850					1.000		1.000	0.850
fLT	0.950	1.000					0.950	1.000		1.000	
Sec.											
fLpb	1.000	1.000					1.000	1.000		1.000	
fRpb		1.000	1.000					1.000		1.000	1.000
S	1770	1863	1583				3437	5074		5074	1583
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	607	1770	#	0.34	0.39	686	0.88
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.39	722	0.00
Right	R	532	1583		0.34	0.39	614	0.87
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	268	3437		0.08	0.11	374	0.72
Prot								
Perm								
Thru	T	1922	5074	#	0.38	0.46	2314	0.83
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1008	5074		0.20	0.28	1433	0.70
Right	R	337	1583		0.21	0.28	447	0.75

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.72
Total lost time per cycle, L = 8.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.86

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.88	0.39	16.3	1.000	686	0.41	13.2	0.0	29.4	C		

LTR	0.00	0.39	10.7	1.000	722	0.11	0.0	0.0	10.7	B	29.0	C
R	0.87	0.39	16.1	1.000	614	0.40	12.5	0.0	28.6	C		
Westbound												
Northbound												
L	0.72	0.11	24.6	1.000	374	0.28	6.5	0.0	31.0	C		
T	0.83	0.46	13.6	1.000	2314	0.37	2.7	0.0	16.3	B	18.1	B
Southbound												
T	0.70	0.28	18.3	1.000	1433	0.27	1.6	0.0	19.9	B	21.4	C
R	0.75	0.28	18.6	1.000	447	0.31	7.1	0.0	25.8	C		

Intersection delay = 21.7 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

			EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach						
Cycle length, C	57.0	sec				
Total actual green time for LT lane group, G (s)						
Effective permitted green time for LT lane group, g(s)						
Opposing effective green time, go (s)						
Number of lanes in LT lane group, N						
Number of lanes in opposing approach, No						
Adjusted LT flow rate, VLT (veh/h)						
Proportion of LT in LT lane group, PLT						
Proportion of LT in opposing flow, PLTo						
Adjusted opposing flow rate, Vo (veh/h)						
Lost time for LT lane group, tL						
Computation						
LT volume per cycle, LTC=VLTC/3600						
Opposing lane util. factor, fLUo				1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)						
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g						
Opposing platoon ratio, Rpo (refer Exhibit 16-11)						
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]						
gq, (see Exhibit C16-4,5,6,7,8)						
gu=g-gq if gq>=gf, or = g-gf if gq<gf						
n=Max(gq-gf)/2,0)						
PTHo=1-PLTo						
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]						
EL1 (refer to Exhibit C16-3)						
EL2=Max((1-Ptho**n)/Plto, 1.0)						
fmin=2(1+PL)/g or fmin=2(1+Pl)/g						
gdiff=max(gq-gf,0)						
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)						
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)						
or flt=[fm+0.91(N-1)]/N**						
Left-turn adjustment, fLT						

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

			EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach						
Cycle length, C	57.0	sec				
Total actual green time for LT lane group, G (s)						
Effective permitted green time for LT lane group, g(s)						
Opposing effective green time, go (s)						
Number of lanes in LT lane group, N						
Number of lanes in opposing approach, No						
Adjusted LT flow rate, VLT (veh/h)						
Proportion of LT in LT lane group, PLT			0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo						
Adjusted opposing flow rate, Vo (veh/h)						
Lost time for LT lane group, tL						
Computation						

LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 1.000 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 57.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				

Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	17.5	16.3	0.00	0.0	0.0	29.4
LTR	0.0	0.00	17.5	10.7	0.00	0.0	0.0	10.7
R	0.0	0.00	17.5	16.1	0.00	0.0	0.0	28.6
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	25.4	24.6	0.00	0.0	0.0	31.0
T	0.0	0.00	15.5	13.6	0.00	0.0	0.0	16.3
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	20.4	18.3	0.00	0.0	0.0	19.9
R	0.0	0.00	20.4	18.6	0.00	0.0	0.0	25.8

Intersection Delay 21.7 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound	
LaneGroup	L	LTR	R				L	T		T	R
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0
Flow Rate	607	0	532				138	705		370	337
So	1900	1900	1900				1900	1900		1900	1900
No.Lanes	1	1	1	0	0	0	2	3	0	3	1
SL	1770	1863	1583				1770	1862		1862	1583
LnCapacity	686	722	614				192	849		526	447
Flow Ratio	0.3	0.0	0.3				0.1	0.4		0.2	0.2
v/c Ratio	0.88	0.00	0.87				0.72	0.83		0.70	0.75
Grn Ratio	0.39	0.39	0.39				0.11	0.46		0.28	0.28
I Factor		1.000						1.000		1.000	
AT or PVG	3	3	3				3	3		3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00
PF2	1.00	1.00	1.00				1.00	1.00		1.00	1.00
Q1	9.0	0.0	7.8				2.1	9.8		5.2	4.9
kB	0.4	0.4	0.4				0.2	0.5		0.4	0.3
Q2	2.6	0.0	2.1				0.5	2.1		0.8	0.9
Q Average	11.5	0.0	9.9				2.6	11.9		6.1	5.8
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0
Q Storage	0	0	0				0	0		0	0
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2	1.2				1.2	1.2		1.2	1.2
BOQ	13.5	0.0	11.6				3.1	13.9		7.2	6.9
QSRatio											
85th Percentile Output:											
fB%	1.5	1.6	1.5				1.6	1.5		1.5	1.5
BOQ	17.3	0.0	15.0				4.1	17.8		9.4	9.0
QSRatio											
90th Percentile Output:											
fB%	1.6	1.8	1.6				1.8	1.6		1.7	1.7
BOQ	18.7	0.0	16.2				4.5	19.2		10.3	9.8
QSRatio											
95th Percentile Output:											
fB%	1.8	2.1	1.8				2.0	1.8		1.9	1.9
BOQ	20.9	0.0	18.2				5.2	21.5		11.7	11.2
QSRatio											
98th Percentile Output:											
fB%	2.1	2.7	2.2				2.5	2.1		2.3	2.3
BOQ	24.3	0.0	21.4				6.5	24.9		14.1	13.6
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 NB Ramps

Inter.: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
LGConfig				L		LT	R	L	T		T	R
Volume				509	3	327		484	815		1337	563
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru					Thru	A	A	A	
Right					Right				
Peds					Peds				
WB Left	A				SB Left				
Thru	A				Thru		A	A	
Right	A				Right		A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	21.3	0.0				15.3	8.2	9.6	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 70.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	539	1770	0.99	0.30	61.5	E		
LT	567	1863	0.01	0.30	17.0	B	47.8	D
R	482	1583	0.71	0.30	26.6	C		
Northbound								
L	387	1770	1.32	0.22	186.5	F		
T	2965	5074	0.29	0.58	7.3	A	74.0	E
Southbound								
T	1587	5074	0.89	0.31	29.3	C	59.6	E
R	495	1583	1.20	0.31	131.4	F		

Intersection Delay = 61.8 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.4

Phone: Fax:

E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Redhill Ave at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 NB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				509	3	327	484	815			1337	563
% Heavy Veh				2	2	2	2	2			2	2
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
PK 15 Vol				134	1	86	127	214			352	148
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900	1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
LGConfig				L		LT	R	L		T			T	R
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0	
Adj Flow				536	3	344	509	858			1407	593
%InSharedLn				0								
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000
Peds Bikes	0				0						0	
Buses				0	0	0	0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Arriv. Type				3	3	3	3	3			3	3
Unit Ext.				3.0	3.0	3.0	3.0	3.0			3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ext of g				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.3	0.0				15.3	8.2	9.6	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 70.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				509	3	327	484	815			1337	563
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
Adj flow				536	3	344	509	858			1407	593
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
Lane group				L	LT	R	L	T			T	R
Adj flow				536	3	344	509	858			1407	593
Prop LTs				0.000			0.000			0.000		
Prop RTs				0.000	1.000		0.000			0.000	1.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG				L	LT	R	L	T			T	R
So				1900	1900	1900	1900	1900			1900	1900
Lanes	0	0		1	1	1	1	3	0	0	3	1
fW				1.000	1.000	1.000	1.000	1.000			1.000	1.000
fHV				0.980	0.980	0.980	0.980	0.980			0.980	0.980
fG				1.000	1.000	1.000	1.000	1.000			1.000	1.000
fP				1.000	1.000	1.000	1.000	1.000			1.000	1.000
fBB				1.000	1.000	1.000	1.000	1.000			1.000	1.000
fA				1.000	1.000	1.000	1.000	1.000			1.000	1.000
fLU				1.000	1.000	1.000	1.000	0.908			0.908	1.000
fRT					1.000	0.850		1.000			1.000	0.850
fLT				0.950	1.000		0.950	1.000			1.000	
Sec.												
fLpb				1.000	1.000		1.000	1.000			1.000	
fRpb					1.000	1.000		1.000			1.000	1.000
S				1770	1863	1583	1770	5074			5074	1583
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	536	1770	#	0.30	0.30	539	0.99
Prot								
Perm								
Thru	LT	3	1863		0.00	0.30	567	0.01
Right	R	344	1583		0.22	0.30	482	0.71
Northbound								
Prot								
Perm								
Left	L	509	1770	#	0.29	0.22	387	1.32
Prot								
Perm								
Thru	T	858	5074		0.17	0.58	2965	0.29
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1407	5074		0.28	0.31	1587	0.89
Right	R	593	1583	#	0.37	0.31	495	1.20

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.97
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.15

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												

Westbound												
L	0.99	0.30	24.3	1.000	539	0.50	37.3	0.0	61.5	E		
LT	0.01	0.30	17.0	1.000	567	0.11	0.0	0.0	17.0	B	47.8	D
R	0.71	0.30	21.6	1.000	482	0.28	5.0	0.0	26.6	C		
Northbound												
L	1.32	0.22	27.4	1.000	387	0.50	159.2	0.0	186.5	F		
T	0.29	0.58	7.3	1.000	2965	0.11	0.1	0.0	7.3	A	74.0	E
Southbound												
T	0.89	0.31	22.9	1.000	1587	0.41	6.5	0.0	29.3	C	59.6	E
R	1.20	0.31	24.0	1.000	495	0.50	107.4	0.0	131.4	F		

Intersection delay = 61.8 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 70.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 70.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				

LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 1.000 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 70.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				

Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	24.4	24.3	0.00	0.0	0.0	61.5
LT	0.0	0.00	24.4	17.0	0.00	0.0	0.0	17.0
R	0.0	0.00	24.4	21.6	0.00	0.0	0.0	26.6
Northbound								
L	0.0	0.00	27.4	27.4	0.00	30.5	0.0	186.5
T	0.0	0.00	14.5	7.3	0.00	0.0	0.0	7.3
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	24.0	22.9	0.00	0.0	0.0	29.3
R	0.0	0.00	24.0	24.0	0.00	24.5	0.0	131.4

Intersection Delay 61.8 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	LT	R	L	T		T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate				536	3	344	509	314		516	593	
So				1900	1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0	1	1	1	1	3	0	3	1	
SL				1770	1863	1583	1770	1862		1862	1583	
LnCapacity				539	567	482	387	1088		582	495	
Flow Ratio				0.3	0.0	0.2	0.3	0.2		0.3	0.4	
v/c Ratio				0.99	0.01	0.71	1.32	0.29		0.89	1.20	
Grn Ratio				0.30	0.30	0.30	0.22	0.58		0.31	0.31	
I Factor					1.000			1.000		1.000		
AT or PVG				3	3	3	3	3		3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Q1				10.4	0.0	5.9	9.9	3.1		9.5	11.5	
kB				0.4	0.4	0.4	0.3	0.6		0.4	0.4	
Q2				5.1	0.0	0.9	16.5	0.3		2.6	14.3	
Q Average				15.4	0.0	6.9	26.4	3.3		12.1	25.8	
Q Spacing				25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage				0	0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.2	1.2	1.2	1.2	1.2		1.2	1.2	
BOQ				18.0	0.1	8.1	30.4	3.9		14.2	29.7	
QSRatio												
85th Percentile Output:												
fB%				1.5	1.6	1.5	1.4	1.6		1.5	1.4	
BOQ				22.9	0.1	10.5	37.7	5.2		18.2	36.8	
QSRatio												
90th Percentile Output:												
fB%				1.6	1.8	1.7	1.5	1.7		1.6	1.5	
BOQ				24.5	0.1	11.5	39.8	5.7		19.6	39.0	
QSRatio												
95th Percentile Output:												
fB%				1.8	2.1	1.9	1.6	2.0		1.8	1.6	
BOQ				27.1	0.1	13.1	43.3	6.6		21.9	42.4	
QSRatio												
98th Percentile Output:												
fB%				2.0	2.7	2.3	1.8	2.5		2.1	1.8	
BOQ				31.0	0.1	15.7	48.4	8.2		25.3	47.4	
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 NB Ramps

Inter.: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
LGConfig				L	LT	R	L	T			T	R
Volume				399	49	503	459	1041			733	308
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru					Thru	A	A	A	
Right					Right				
Peds					Peds				
WB Left		A			SB Left				
Thru		A			Thru		A	A	
Right		A			Right		A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green		34.1	0.0			27.7	10.0	7.7	0.0
Yellow		3.2				3.2	3.6	3.6	
All Red		0.5				0.5	0.5	0.5	

Cycle Length: 95.1 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	635	1770	0.66	0.36	28.2	C		
LT	668	1863	0.08	0.36	20.2	C	40.2	D
R	568	1583	0.93	0.36	51.7	D		
Northbound								
L	516	1770	0.94	0.29	57.6	E		
T	2838	5074	0.39	0.56	11.9	B	25.8	C
Southbound								
T	1163	5074	0.66	0.23	34.8	C	41.8	D
R	363	1583	0.89	0.23	58.7	E		

Intersection Delay = 34.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 NB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				399	49	503	459	1041			733	308
% Heavy Veh				2	2	2	2	2			2	2
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
PK 15 Vol				105	13	132	121	274			193	81
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900	1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
LGConfig					L		LT	R	L		T			T	R
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0
Adj Flow				420	52	529	483	1096			772	324
%InSharedLn				0								
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000
Peds Bikes	0				0						0	
Buses				0	0	0	0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Arriv. Type				3	3	3	3	3			3	3
Unit Ext.				3.0	3.0	3.0	3.0	3.0			3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ext of g				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru					Thru	A	A	A	
Right					Right				
Peds					Peds				
WB Left		A			SB Left				
Thru		A			Thru		A	A	
Right		A			Right		A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green		34.1	0.0			27.7	10.0	7.7	0.0
Yellow		3.2				3.2	3.6	3.6	
All Red		0.5				0.5	0.5	0.5	

Cycle Length: 95.1 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				399	49	503	459	1041			733	308
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
Adj flow				420	52	529	483	1096			772	324
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
Lane group				L	LT	R	L	T			T	R
Adj flow				420	52	529	483	1096			772	324
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG				L	LT	R	L	T			T	R
So				1900	1900	1900	1900	1900			1900	1900
Lanes	0	0	0	1	1	1	1	3	0	0	3	1
fW				1.000	1.000	1.000	1.000	1.000			1.000	1.000
fHV				0.980	0.980	0.980	0.980	0.980			0.980	0.980
fG				1.000	1.000	1.000	1.000	1.000			1.000	1.000
fP				1.000	1.000	1.000	1.000	1.000			1.000	1.000
fBB				1.000	1.000	1.000	1.000	1.000			1.000	1.000
fA				1.000	1.000	1.000	1.000	1.000			1.000	1.000
fLU				1.000	1.000	1.000	1.000	0.908			0.908	1.000
fRT					1.000	0.850		1.000			1.000	0.850
fLT				0.950	1.000		0.950	1.000			1.000	
Sec.												
fLpb				1.000	1.000		1.000	1.000			1.000	
fRpb					1.000	1.000		1.000			1.000	1.000
S				1770	1863	1583	1770	5074			5074	1583
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	420	1770		0.24	0.36	635	0.66
Prot								
Perm								
Thru	LT	52	1863		0.03	0.36	668	0.08
Right	R	529	1583	#	0.33	0.36	568	0.93
Northbound								
Prot								
Perm								
Left	L	483	1770	#	0.27	0.29	516	0.94
Prot								
Perm								
Thru	T	1096	5074		0.22	0.56	2838	0.39
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	772	5074		0.15	0.23	1163	0.66
Right	R	324	1583	#	0.20	0.23	363	0.89

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.81
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.92

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												

Westbound												
L	0.66	0.36	25.6	1.000	635	0.24	2.6	0.0	28.2	C		
LT	0.08	0.36	20.1	1.000	668	0.11	0.1	0.0	20.2	C	40.2	D
R	0.93	0.36	29.4	1.000	568	0.45	22.3	0.0	51.7	D		
Northbound												
L	0.94	0.29	32.8	1.000	516	0.45	24.7	0.0	57.6	E		
T	0.39	0.56	11.8	1.000	2838	0.11	0.1	0.0	11.9	B	25.8	C
Southbound												
T	0.66	0.23	33.3	1.000	1163	0.24	1.4	0.0	34.8	C	41.8	D
R	0.89	0.23	35.5	1.000	363	0.42	23.2	0.0	58.7	E		

Intersection delay = 34.5 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.1 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.1 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				

Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 1.000 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 95.1 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				

Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	30.5	25.6	0.00	0.0	0.0	28.2
LT	0.0	0.00	30.5	20.1	0.00	0.0	0.0	20.2
R	0.0	0.00	30.5	29.4	0.00	0.0	0.0	51.7
Northbound								
L	0.0	0.00	33.7	32.8	0.00	0.0	0.0	57.6
T	0.0	0.00	20.9	11.8	0.00	0.0	0.0	11.9
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	36.6	33.3	0.00	0.0	0.0	34.8
R	0.0	0.00	36.6	35.5	0.00	0.0	0.0	58.7

Intersection Delay 34.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound				Southbound		
LaneGroup				L	LT	R	L	T			T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0			0.0	0.0	
Flow Rate				420	52	529	483	402			283	324	
So				1900	1900	1900	1900	1900			1900	1900	
No.Lanes	0	0	0	1	1	1	1	3	0	0	3	1	
SL				1770	1863	1583	1770	1862			1862	1583	
LnCapacity				635	668	568	516	1041			426	363	
Flow Ratio				0.2	0.0	0.3	0.3	0.2			0.2	0.2	
v/c Ratio				0.66	0.08	0.93	0.94	0.39			0.66	0.89	
Grn Ratio				0.36	0.36	0.36	0.29	0.56			0.23	0.23	
I Factor					1.000			1.000			1.000		
AT or PVG				3	3	3	3	3			3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00			1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00			1.00	1.00	
Q1				9.3	0.9	13.5	12.4	6.0			6.8	8.3	
kB				0.5	0.6	0.5	0.5	0.7			0.4	0.4	
Q2				1.0	0.0	3.8	3.7	0.5			0.8	2.2	
Q Average				10.4	1.0	17.3	16.1	6.4			7.6	10.5	
Q Spacing				25.0	25.0	25.0	25.0	25.0			25.0	25.0	
Q Storage				0	0	0	0	0			0	0	
Q S Ratio													
70th Percentile Output:													
fB%				1.2	1.2	1.2	1.2	1.2			1.2	1.2	
BOQ				12.2	1.1	20.2	18.8	7.6			9.0	12.4	
QSRatio													
85th Percentile Output:													
fB%				1.5	1.6	1.5	1.5	1.5			1.5	1.5	
BOQ				15.7	1.5	25.4	23.8	9.9			11.7	15.9	
QSRatio													
90th Percentile Output:													
fB%				1.6	1.8	1.6	1.6	1.7			1.7	1.6	
BOQ				17.0	1.7	27.1	25.5	10.9			12.7	17.2	
QSRatio													
95th Percentile Output:													
fB%				1.8	2.1	1.7	1.7	1.9			1.9	1.8	
BOQ				19.0	2.0	29.9	28.1	12.3			14.4	19.3	
QSRatio													
98th Percentile Output:													
fB%				2.2	2.6	2.0	2.0	2.3			2.3	2.1	
BOQ				22.3	2.5	34.0	32.1	14.8			17.2	22.6	
QSRatio													

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps

Inter.: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
LGConfig		LT	R					T	R	L	T	
Volume	242	0	437					1050	603	508	1320	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	26.7	0.0			28.3	8.3	26.1	0.0
Yellow	3.2				3.2	3.6	3.6	
All Red	0.5				0.5	0.5	0.5	

Cycle Length: 105.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	451	1774	0.57	0.25	35.8	D	95.4	F
R	403	1583	1.14	0.25	128.5	F		
Westbound								
Northbound								
T	2481	6765	0.45	0.37	25.3	C	52.2	D
R	580	1583	1.09	0.37	99.1	F		
Southbound								
L	477	1770	1.12	0.27	117.2	F		
T	4542	6765	0.31	0.67	7.2	A	37.8	D

Intersection Delay = 52.9 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	242	0	437					1050	603	508	1320	
% Heavy Veh	2	2	2					2	2	2	2	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
PK 15 Vol	64	0	115					276	159	134	347	
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat		1900	1900					1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
LGConfig		LT	R					T	R	L	T	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			
Adj Flow		255	460					1105	635	535	1389	
%InSharedLn												
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	
Peds Bikes	0			0			0					
Buses		0	0					0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0					0.0	0.0	0.0	0.0	
Arriv. Type		3	3					3	3	3	3	
Unit Ext.		3.0	3.0					3.0	3.0	3.0	3.0	
I Factor		1.000						1.000			1.000	
Lost Time		2.0	2.0					2.0	2.0	2.0	2.0	
Ext of g		2.0	2.0					2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	26.7	0.0				28.3	8.3	26.1 0.0
Yellow	3.2					3.2	3.6	3.6
All Red	0.5					0.5	0.5	0.5

Cycle Length: 105.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	242	0	437					1050	603	508	1320	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
Adj flow	255	0	460					1105	635	535	1389	
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
Lane group		LT	R					T	R	L	T	
Adj flow		255	460					1105	635	535	1389	
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG	LT	R					T	R		L	T	
So	1900	1900					1900	1900		1900	1900	
Lanes	0 1	0 1	0	0	0	0	4	1	0	1	4	0
fW	1.000	1.000					1.000	1.000		1.000	1.000	
fHV	0.980	0.980					0.980	0.980		0.980	0.980	
fG	1.000	1.000					1.000	1.000		1.000	1.000	
fP	1.000	1.000					1.000	1.000		1.000	1.000	
fBB	1.000	1.000					1.000	1.000		1.000	1.000	
fA	1.000	1.000					1.000	1.000		1.000	1.000	
fLU	1.000	1.000					0.908	1.000		1.000	0.908	
fRT	1.000	0.850					1.000	0.850			1.000	
fLT	0.952						1.000			0.950	1.000	
Sec.												
fLpb	1.000						1.000			1.000	1.000	
fRpb	1.000	1.000					1.000	1.000			1.000	
S	1774	1583					6765	1583		1770	6765	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	255	1774		0.14	0.25	451	0.57
Right	R	460	1583	#	0.29	0.25	403	1.14
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1105	6765		0.16	0.37	2481	0.45
Right	R	635	1583	#	0.40	0.37	580	1.09
Southbound								
Prot								
Perm								
Left	L	535	1770	#	0.30	0.27	477	1.12
Prot								
Perm								
Thru	T	1389	6765		0.21	0.67	4542	0.31
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.99
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.12

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS

Eastbound												
LT	0.57	0.25	34.1	1.000	451	0.16	1.7	0.0	35.8	D	95.4	F
R	1.14	0.25	39.1	1.000	403	0.50	89.3	0.0	128.5	F		
Westbound												
Northbound												
T	0.45	0.37	25.2	1.000	2481	0.11	0.1	0.0	25.3	C	52.2	D
R	1.09	0.37	33.3	1.000	580	0.50	65.9	0.0	99.1	F		
Southbound												
L	1.12	0.27	38.4	1.000	477	0.50	78.9	0.0	117.2	F		
T	0.31	0.67	7.1	1.000	4542	0.11	0.0	0.0	7.2	A	37.8	D

Intersection delay = 52.9 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 105.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 105.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	1.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				

Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 1.000 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 105.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				

XProt
Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
LT	0.0	0.00	39.1	34.1	0.00	0.0	0.0	35.8
R	0.0	0.00	39.1	39.1	0.00	14.2	0.0	128.5
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	33.3	25.2	0.00	0.0	0.0	25.3
R	0.0	0.00	33.3	33.3	0.00	13.7	0.0	99.1
Southbound								
L	0.0	0.00	38.4	38.4	0.00	14.5	0.0	117.2
T	0.0	0.00	17.3	7.1	0.00	0.0	0.0	7.2
	0.0						0.0	

Intersection Delay 52.9 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	LT	R			T	R	L	T
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	255	460			304	635	535	382
So	1900	1900			1900	1900	1900	1900
No.Lanes	0 1	1	0	0 0	0 4	1	1	4 0
SL	1774	1583			1862	1583	1770	1862
LnCapacity	451	403			683	580	477	1250
Flow Ratio	0.1	0.3			0.2	0.4	0.3	0.2
v/c Ratio	0.57	1.14			0.45	1.09	1.12	0.31
Grn Ratio	0.25	0.25			0.37	0.37	0.27	0.67
I Factor	1.000				1.000			1.000
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00	1.00	1.00	1.00
Q1	6.5	13.4			6.7	18.5	15.6	4.6
kB	0.5	0.4			0.6	0.5	0.5	0.9
Q2	0.6	9.7			0.5	10.9	10.4	0.4
Q Average	7.1	23.1			7.2	29.4	26.0	5.0
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2	1.1	1.2	1.2
BOQ	8.4	26.7			8.5	33.7	29.9	5.9
QSRatio								
85th Percentile Output:								
fB%	1.5	1.4			1.5	1.4	1.4	1.6
BOQ	10.9	33.3			11.0	41.5	37.1	7.7
QSRatio								
90th Percentile Output:								
fB%	1.7	1.5			1.7	1.5	1.5	1.7
BOQ	11.9	35.3			12.1	43.8	39.2	8.5
QSRatio								
95th Percentile Output:								
fB%	1.9	1.7			1.9	1.6	1.6	2.0
BOQ	13.5	38.5			13.7	47.5	42.7	9.7
QSRatio								
98th Percentile Output:								
fB%	2.3	1.9			2.3	1.8	1.8	2.4
BOQ	16.1	43.2			16.4	53.0	47.7	11.9
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps

Inter.: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
LGConfig		LT	R					T	R	L	T	
Volume	412	0	332					1088	537	383	738	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.0	0.0				18.6	10.9	13.9	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	466	1774	0.93	0.26	54.4	D	48.9	D
R	416	1583	0.84	0.26	42.0	D		
Westbound								
Northbound								
T	2444	6765	0.47	0.36	19.8	B	33.0	C
R	572	1583	0.99	0.36	59.8	E		
Southbound								
L	412	1770	0.98	0.23	69.0	E		
T	4330	6765	0.18	0.64	5.9	A	27.4	C

Intersection Delay = 34.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	412	0	332					1088	537	383	738	
% Heavy Veh	2	2	2					2	2	2	2	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
PK 15 Vol	108	0	87					286	141	101	194	
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat		1900	1900					1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
LGConfig		LT	R					T	R	L	T	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			
Adj Flow		434	349					1145	565	403	777	
%InSharedLn												
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	
Peds Bikes	0			0			0					
Buses		0	0					0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0					0.0	0.0	0.0	0.0	
Arriv. Type		3	3					3	3	3	3	
Unit Ext.		3.0	3.0					3.0	3.0	3.0	3.0	
I Factor		1.000						1.000			1.000	
Lost Time		2.0	2.0					2.0	2.0	2.0	2.0	
Ext of g		2.0	2.0					2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.0	0.0				18.6	10.9	13.9	0.0
Yellow	3.2					3.2	3.6	3.6	

All Red 0.5 0.5 0.5 0.5

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	412	0	332					1088	537	383	738	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
Adj flow	434	0	349					1145	565	403	777	
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
Lane group		LT	R					T	R	L	T	
Adj flow		434	349					1145	565	403	777	
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound						Westbound						Northbound			Southbound		
LG		LT	R										T	R		L	T	
So		1900	1900										1900	1900		1900	1900	
Lanes	0	1	1	0	0	0	0						4	1		1	4	0
fW		1.000	1.000										1.000	1.000		1.000	1.000	
fHV		0.980	0.980										0.980	0.980		0.980	0.980	
fG		1.000	1.000										1.000	1.000		1.000	1.000	
fP		1.000	1.000										1.000	1.000		1.000	1.000	
fBB		1.000	1.000										1.000	1.000		1.000	1.000	
fA		1.000	1.000										1.000	1.000		1.000	1.000	
fLU		1.000	1.000										0.908	1.000		1.000	0.908	
fRT		1.000	0.850										1.000	0.850			1.000	
fLT		0.952											1.000			0.950	1.000	
Sec.																		
fLpb		1.000											1.000			1.000	1.000	
fRpb		1.000	1.000										1.000	1.000			1.000	
S		1774	1583										6765	1583		1770	6765	
Sec.																		

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	434	1774	#	0.24	0.26	466	0.93
Right	R	349	1583		0.22	0.26	416	0.84
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1145	6765		0.17	0.36	2444	0.47
Right	R	565	1583	#	0.36	0.36	572	0.99
Southbound								
Prot								
Perm								
Left	L	403	1770	#	0.23	0.23	412	0.98
Prot								
Perm								
Thru	T	777	6765		0.11	0.64	4330	0.18
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.83
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.97

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
LT	0.93	0.26	28.8	1.000	466	0.45	25.6	0.0	54.4	D	48.9	D
R	0.84	0.26	27.9	1.000	416	0.37	14.1	0.0	42.0	D		
Westbound												
Northbound												
T	0.47	0.36	19.6	1.000	2444	0.11	0.1	0.0	19.8	B	33.0	C
R	0.99	0.36	25.4	1.000	572	0.49	34.4	0.0	59.8	E		
Southbound												
L	0.98	0.23	30.5	1.000	412	0.48	38.5	0.0	69.0	E		
T	0.18	0.64	5.9	1.000	4330	0.11	0.0	0.0	5.9	A	27.4	C

Intersection delay = 34.6 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				

Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT 1.000 0.000 0.000
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 1.000 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					

Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)
XPerm
XProt
Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
LT	0.0	0.00	29.5	28.8	0.00	0.0	0.0	54.4
R	0.0	0.00	29.5	27.9	0.00	0.0	0.0	42.0
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	25.6	19.6	0.00	0.0	0.0	19.8
R	0.0	0.00	25.6	25.4	0.00	0.0	0.0	59.8
Southbound								
L	0.0	0.00	30.7	30.5	0.00	0.0	0.0	69.0
T	0.0	0.00	14.4	5.9	0.00	0.0	0.0	5.9
	0.0						0.0	

Intersection Delay 34.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound		Southbound		
LaneGroup	LT	R				T	R	L	T	
Init Queue	0.0	0.0				0.0	0.0	0.0	0.0	
Flow Rate	434	349				315	565	403	213	
So	1900	1900				1900	1900	1900	1900	
No.Lanes	1	1	0	0	0	4	1	1	4	0
SL	1774	1583				1862	1583	1770	1862	
LnCapacity	466	416				672	572	412	1192	
Flow Ratio	0.2	0.2				0.2	0.4	0.2	0.1	
v/c Ratio	0.93	0.84				0.47	0.99	0.98	0.18	
Grn Ratio	0.26	0.26				0.36	0.36	0.23	0.64	
I Factor	1.000					1.000			1.000	
AT or PVG	3	3				3	3	3	3	
Pltn Ratio	1.00	1.00				1.00	1.00	1.00	1.00	
PF2	1.00	1.00				1.00	1.00	1.00	1.00	
Q1	9.4	7.3				5.4	12.5	8.9	1.9	
kB	0.4	0.4				0.5	0.5	0.4	0.7	
Q2	3.1	1.7				0.4	5.3	3.8	0.2	
Q Average	12.5	9.0				5.8	17.7	12.7	2.1	
Q Spacing	25.0	25.0				25.0	25.0	25.0	25.0	
Q Storage	0	0				0	0	0	0	
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2				1.2	1.2	1.2	1.2	
BOQ	14.7	10.6				6.9	20.7	14.9	2.5	
QSRatio										
85th Percentile Output:										
fB%	1.5	1.5				1.5	1.5	1.5	1.6	
BOQ	18.7	13.7				9.0	26.0	19.0	3.3	
QSRatio										
90th Percentile Output:										
fB%	1.6	1.7				1.7	1.6	1.6	1.8	
BOQ	20.2	14.9				9.9	27.8	20.5	3.7	
QSRatio										
95th Percentile Output:										
fB%	1.8	1.9				1.9	1.7	1.8	2.0	
BOQ	22.5	16.8				11.3	30.6	22.9	4.2	
QSRatio										
98th Percentile Output:										
fB%	2.1	2.2				2.3	2.0	2.1	2.6	
BOQ	26.1	19.8				13.6	34.7	26.4	5.3	

QSRatio | | | | |

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps

Inter.: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Newport Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Volume	279	61	438	74		157		1074	82	177	1859	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right	A	A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right	A	A	A
SB Right					WB Right			
Green	7.2	12.6	0.0			9.8	11.0	6.2	0.0
Yellow	3.6	3.6				3.2	3.9	3.9	
All Red	1.0	1.0				1.0	1.0	1.0	

Cycle Length: 70.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	319	1770	0.92	0.18	59.2	E		
LT	335	1863	0.19	0.18	24.7	C	23.2	C
R	1583	1583	0.29	1.00	0.1	A		
Westbound								
L	182	1770	0.43	0.10	31.1	C		
							81.4	F
R	163	1583	1.01	0.10	105.1	F		
Northbound								
TR	1585	5020	0.77	0.32	24.0	C	24.0	C
Southbound								
L	248	1770	0.75	0.14	40.9	D		
T	2617	5074	0.75	0.52	14.6	B	16.9	B

Intersection Delay = 23.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps N/S St: Newport Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	279	61	438	74		157		1074	82	177	1859	
% Heavy Veh	2	2	2	2		2		2	2	2	2	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol	73	16	115	19		41		283	22	47	489	
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900	1900	1900		1900		1900		1900	1900	
ParkExist												
NumPark												
No. Lanes		1	1	1		1	0	1		0	3	0		1	3	0
LGConfig	L		LT	R	L			R			TR		L		T	
Lane Width	12.0	12.0	12.0	12.0		12.0				12.0			12.0	12.0		
RTOR Vol			0			0					0					
Adj Flow	294	64	461	78		165				1217			186	1957		
%InSharedLn	0															
Prop LTs		0.000								0.000				0.000		
Prop RTs		0.000	1.000			1.000				0.071				0.000		
Peds Bikes		0			0					0						
Buses	0	0	0	0		0				0			0	0		
%InProtPhase																

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Arriv. Type	3	3	3	3		3		3		3	3	
Unit Ext.	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left		A			NB Left				
Thru		A			Thru		A	A	
Right	A	A			Right		A	A	
Peds					Peds				
WB Left	A				SB Left	A			
Thru					Thru	A	A	A	
Right	A				Right				
Peds					Peds				
NB Right					EB Right	A	A	A	
SB Right					WB Right				
Green	7.2	12.6	0.0			9.8	11.0	6.2	0.0

Yellow	3.6	3.6				3.2	3.9	3.9			
All Red	1.0	1.0				1.0	1.0	1.0			

Cycle Length: 70.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	279	61	438	74		157		1074	82	177	1859	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow	294	64	461	78		165		1131	86	186	1957	
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
Lane group	L	LT	R	L		R		TR		L	T	
Adj flow	294	64	461	78		165		1217		186	1957	
Prop LTs		0.000						0.000			0.000	
Prop RTs	0.000		1.000			1.000	0.071			0.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LT	R	L		R	TR			L	T	
So	1900	1900	1900	1900		1900	1900			1900	1900	
Lanes	1	1	1	1	0	1	0	3	0	1	3	0
fW	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fHV	0.980	0.980	0.980	0.980		0.980		0.980		0.980	0.980	
fG	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fP	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fBB	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fA	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fLU	1.000	1.000	1.000	1.000		1.000		0.908		1.000	0.908	
fRT		1.000	0.850			0.850		0.989			1.000	
fLT	0.950	1.000		0.950				1.000		0.950	1.000	
Sec.												
fLpb	1.000	1.000		1.000				1.000		1.000	1.000	
fRpb		1.000	1.000			1.000		1.000			1.000	
S	1770	1863	1583	1770		1583		5020		1770	5074	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	294	1770	#	0.17	0.18	319	0.92
Prot								
Perm								
Thru	LT	64	1863		0.03	0.18	335	0.19
Right	R	461	1583		0.29	1.00	1583	0.29
Westbound								
Prot								
Perm								
Left	L	78	1770		0.04	0.10	182	0.43
Prot								
Perm								
Thru								
Right	R	165	1583	#	0.10	0.10	163	1.01
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1217	5020		0.24	0.32	1585	0.77
Right								
Southbound								
Prot								
Perm								
Left	L	186	1770		0.11	0.14	248	0.75
Prot								
Perm								
Thru	T	1957	5074	#	0.39	0.52	2617	0.75
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.66
Total lost time per cycle, L = 14.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.82

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
L	0.92	0.18	28.2	1.000	319	0.44	31.0	0.0	59.2	E		
LT	0.19	0.18	24.4	1.000	335	0.11	0.3	0.0	24.7	C	23.2	C
R	0.29	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Westbound												
L	0.43	0.10	29.5	1.000	182	0.11	1.6	0.0	31.1	C		
											81.4	F
R	1.01	0.10	31.4	1.000	163	0.50	73.7	0.0	105.1	F		
Northbound												
TR	0.77	0.32	21.6	1.000	1585	0.32	2.3	0.0	24.0	C	24.0	C
Southbound												
L	0.75	0.14	28.9	1.000	248	0.31	12.0	0.0	40.9	D		
T	0.75	0.52	13.4	1.000	2617	0.30	1.2	0.0	14.6	B	16.9	B

Intersection delay = 23.6 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 70.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 70.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				

Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT 0.000 0.000 0.000
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 1.000 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 70.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				

Protected ph. departure rate, Sp=s/3600
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)
XPerm
XProt
Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	28.7	28.2	0.00	0.0	0.0	59.2
LT	0.0	0.00	28.7	24.4	0.00	0.0	0.0	24.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Westbound								
L	0.0	0.00	31.4	29.5	0.00	0.0	0.0	31.1
	0.0						0.0	
R	0.0	0.00	31.4	31.4	0.00	0.5	0.0	105.1
Northbound								
	0.0						0.0	
TR	0.0	0.00	24.0	21.6	0.00	0.0	0.0	24.0
	0.0						0.0	
Southbound								
L	0.0	0.00	30.1	28.9	0.00	0.0	0.0	40.9
T	0.0	0.00	17.0	13.4	0.00	0.0	0.0	14.6
	0.0						0.0	

Intersection Delay 23.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound	Southbound	
LaneGroup	L	LT	R	L	R	TR	L	T
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate	294	64	461	78	165	446	186	718
So	1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	1	1	1	1 0	1	0 3 0	1	3 0
SL	1770	1863	1583	1770	1583	1842	1770	1862
LnCapacity	319	335	1583	182	163	581	248	960
Flow Ratio	0.2	0.0	0.3	0.0	0.1	0.2	0.1	0.4
v/c Ratio	0.92	0.19	0.29	0.43	1.01	0.77	0.75	0.75
Grn Ratio	0.18	0.18	1.00	0.10	0.10	0.32	0.14	0.52
I Factor		1.000		1.000		1.000		1.000
AT or PVG	3	3	3	3	3	3	3	3
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1	5.6	1.1		1.4	3.2	7.8	3.5	11.0
kB	0.3	0.3	0.8	0.2	0.2	0.4	0.3	0.6
Q2	2.1	0.1	0.3	0.2	2.2	1.3	0.7	1.6
Q Average	7.7	1.1		1.6	5.4	9.1	4.2	12.6
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage	0	0	0	0	0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2		1.2	1.2	1.2	1.2	1.2
BOQ	9.1	1.4		1.9	6.4	10.8	5.0	14.8
QSRatio								
85th Percentile Output:								
fB%	1.5	1.6		1.6	1.6	1.5	1.6	1.5
BOQ	11.8	1.8		2.5	8.3	13.9	6.5	18.9
QSRatio								
90th Percentile Output:								
fB%	1.7	1.8		1.8	1.7	1.7	1.7	1.6
BOQ	12.9	2.0		2.8	9.2	15.1	7.2	20.4
QSRatio								
95th Percentile Output:								
fB%	1.9	2.1		2.0	1.9	1.9	2.0	1.8
BOQ	14.6	2.3		3.2	10.4	17.0	8.3	22.7
QSRatio								
98th Percentile Output:								
fB%	2.3	2.6		2.6	2.4	2.2	2.4	2.1

| | | |

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-5 SB Ramps N/S St: Newport Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	371	49	580	78		172		1877	98	246	1138	
% Heavy Veh	2	2	2	2		2		2	2	2	2	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol	98	13	153	21		45		494	26	65	299	
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900	1900	1900		1900		1900		1900	1900	
ParkExist												
NumPark												
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol		0			0			0				
Adj Flow	391	52	611	82		181		2079		259	1198	
%InSharedLn	0											
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.050			0.000	
Peds Bikes	0			0			0					
Buses	0	0	0	0		0		0		0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Arriv. Type	3	3	3	3		3		3		3	3	
Unit Ext.	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right	A	A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right	A	A	A
SB Right					WB Right			

Green	15.5	24.5	0.0		15.4	26.7	24.7	0.0	
Yellow	3.6	3.6			3.2	3.9	3.9		
All Red	1.0	1.0			1.0	1.0	1.0		

Cycle Length: 130.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	371	49	580	78		172		1877	98	246	1138	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow	391	52	611	82		181		1976	103	259	1198	
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
Lane group	L	LT	R	L		R		TR		L	T	
Adj flow	391	52	611	82		181		2079		259	1198	
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.050			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LT	R	L		R	TR			L	T	
So	1900	1900	1900	1900		1900	1900			1900	1900	
Lanes	1	1	1	1	0	1	3	0		1	3	0
fW	1.000	1.000	1.000	1.000		1.000	1.000			1.000	1.000	
fHV	0.980	0.980	0.980	0.980		0.980	0.980			0.980	0.980	
fG	1.000	1.000	1.000	1.000		1.000	1.000			1.000	1.000	
fP	1.000	1.000	1.000	1.000		1.000	1.000			1.000	1.000	
fBB	1.000	1.000	1.000	1.000		1.000	1.000			1.000	1.000	
fA	1.000	1.000	1.000	1.000		1.000	1.000			1.000	1.000	
fLU	1.000	1.000	1.000	1.000		1.000	0.908			1.000	0.908	
fRT		1.000	0.850			0.850	0.993				1.000	
fLT	0.950	1.000		0.950			1.000			0.950	1.000	
Sec.												
fLpb	1.000	1.000		1.000			1.000			1.000	1.000	
fRpb		1.000	1.000			1.000	1.000				1.000	
S	1770	1863	1583	1770		1583	5036			1770	5074	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	391	1770	#	0.22	0.19	334	1.17
Prot								
Perm								
Thru	LT	52	1863		0.03	0.19	351	0.15
Right	R	611	1583		0.39	1.00	1583	0.39
Westbound								
Prot								
Perm								
Left	L	82	1770		0.05	0.12	211	0.39
Prot								
Perm								
Thru								
Right	R	181	1583	#	0.11	0.12	189	0.96
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	2079	5036	#	0.41	0.43	2181	0.95
Right								
Southbound								
Prot								
Perm								
Left	L	259	1770	#	0.15	0.12	210	1.23
Prot								
Perm								
Thru	T	1198	5074		0.24	0.58	2962	0.40
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.89
Total lost time per cycle, L = 18.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.04

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.17	0.19	52.8	1.000	334	0.50	104.1	0.0	156.8	F		
LT	0.15	0.19	44.0	1.000	351	0.11	0.2	0.0	44.2	D	60.5	E
R	0.39	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Westbound												
L	0.39	0.12	52.9	1.000	211	0.11	1.2	0.0	54.1	D		
											92.6	F
R	0.96	0.12	56.9	1.000	189	0.47	53.1	0.0	110.0	F		
Northbound												
TR	0.95	0.43	35.6	1.000	2181	0.46	10.4	0.0	46.0	D	46.0	D
Southbound												
L	1.23	0.12	57.3	1.000	210	0.50	139.2	0.0	196.5	F		
T	0.40	0.58	14.7	1.000	2962	0.11	0.1	0.0	14.8	B	47.1	D

Intersection delay = 52.0 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 130.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 130.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				

Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT 0.000 0.000 0.000
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 1.000 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 130.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				

Arrival rate, qa=v/(3600(max[X,1.0]))
Protected ph. departure rate, Sp=s/3600
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)
XPerm
XProt
Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	52.8	52.8	0.00	14.3	0.0	156.8
LT	0.0	0.00	52.8	44.0	0.00	0.0	0.0	44.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
L	0.0	0.00	57.3	52.9	0.00	0.0	0.0	54.1
	0.0						0.0	
R	0.0	0.00	57.3	56.9	0.00	0.0	0.0	110.0
Northbound								
	0.0						0.0	
TR	0.0	0.00	36.8	35.6	0.00	0.0	0.0	46.0
	0.0						0.0	
Southbound								
L	0.0	0.00	57.3	57.3	0.00	12.3	0.0	196.5
T	0.0	0.00	27.0	14.7	0.00	0.0	0.0	14.8
	0.0						0.0	

Intersection Delay 52.0 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

LaneGroup	Eastbound L	Eastbound LT	Eastbound R	Westbound L	Westbound R	Northbound TR	Southbound L	Southbound T
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate	391	52	611	82	181	763	259	439
So	1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	1	1	1	1	1	3	1	3
SL	1770	1863	1583	1770	1583	1848	1770	1862
LnCapacity	334	351	1583	211	189	800	210	1087
Flow Ratio	0.2	0.0	0.4	0.0	0.1	0.4	0.1	0.2
v/c Ratio	1.17	0.15	0.39	0.39	0.96	0.95	1.23	0.40
Grn Ratio	0.19	0.19	1.00	0.12	0.12	0.43	0.12	0.58
I Factor		1.000		1.000		1.000		1.000
AT or PVG	3	3	3	3	3	3	3	3
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1	14.1	1.6		2.7	6.5	26.6	9.4	8.6
kB	0.4	0.5	1.1	0.3	0.3	0.8	0.3	0.9
Q2	9.4	0.1	0.7	0.2	2.2	6.5	7.6	0.6
Q Average	23.6	1.6		2.9	8.7	33.1	16.9	9.2
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage	0	0	0	0	0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2		1.2	1.2	1.1	1.2	1.2
BOQ	27.2	2.0		3.5	10.3	37.8	19.7	10.9
QSRatio								
85th Percentile Output:								
fB%	1.4	1.6		1.6	1.5	1.4	1.5	1.5
BOQ	33.8	2.6		4.6	13.3	46.3	24.9	14.1
QSRatio								
90th Percentile Output:								
fB%	1.5	1.8		1.7	1.7	1.5	1.6	1.7
BOQ	35.9	2.9		5.1	14.5	48.8	26.6	15.3
QSRatio								
95th Percentile Output:								
fB%	1.7	2.0		2.0	1.9	1.6	1.7	1.9
BOQ	39.1	3.4		5.9	16.3	52.8	29.3	17.2
QSRatio								
98th Percentile Output:								

fB%	1.9	2.6		2.5	2.2		1.8		2.0	2.2	
BOQ	43.9	4.3		7.4	19.3		58.8		33.4	20.2	
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: Pb
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 NB Ramps

Inter.: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Volume				876		519		851	560		1324	930
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right	A	A		
Peds					Peds				
NB Right		A			EB Right				
SB Right		A			WB Right				
Green		24.5	0.0			4.3	9.5	0.0	
Yellow		4.3				4.3	3.6		
All Red		3.5				3.5	2.5		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1403	3437	0.66	0.41	15.5	B		
							19.4	B
R	646	1583	0.85	0.41	26.1	C		
Northbound								
T	1827	5074	0.49	0.36	15.1	B	9.2	A
R	1583	1583	0.37	1.00	0.1	A		
Southbound								
T	1827	5074	0.76	0.36	18.9	B	11.4	B
R	1583	1583	0.62	1.00	0.7	A		

Intersection Delay = 13.0 (sec/veh) Intersection LOS = B

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: Pb
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 NB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				876		519		851	560		1324	930
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				231		137		224	147		348	245
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				922		546		896	589		1394	979
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination 1 2 3 4 | 5 6 7 8

EB	Left			NB	Left		
	Thru				Thru	A	A
	Right				Right	A	A
	Peds				Peds		
WB	Left	A		SB	Left		
	Thru				Thru	A	A
	Right	A			Right	A	A
	Peds				Peds		
NB	Right	A		EB	Right		
SB	Right	A		WB	Right		

Green	24.5	0.0				4.3	9.5	0.0			
Yellow	4.3					4.3	3.6				
All Red	3.5					3.5	2.5				

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				876		519		851	560		1324	930
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				922		546		896	589		1394	979
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
Lane group				L		R		T	R		T	R
Adj flow				922		546		896	589		1394	979
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R		T	R		T	R
So				1900		1900		1900	1900		1900	1900
Lanes	0	0	0	2	0	1	0	3	1	0	3	1
fW				1.000		1.000		1.000	1.000		1.000	1.000
fHV				0.980		0.980		0.980	0.980		0.980	0.980
fG				1.000		1.000		1.000	1.000		1.000	1.000
fP				1.000		1.000		1.000	1.000		1.000	1.000
fBB				1.000		1.000		1.000	1.000		1.000	1.000
fA				1.000		1.000		1.000	1.000		1.000	1.000
fLU				0.971		1.000		0.908	1.000		0.908	1.000
fRT						0.850		1.000	0.850		1.000	0.850
fLT				0.950				1.000			1.000	
Sec.												
fLpb				1.000				1.000			1.000	
fRpb						1.000		1.000	1.000		1.000	1.000
S				3437		1583		5074	1583		5074	1583
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group		Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru									
Right									
Westbound									
Prot									
Perm									
Left	L		922	3437		0.27	0.41	1403	0.66
Prot									
Perm									
Thru									
Right	R		546	1583	#	0.34	0.41	646	0.85
Northbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru	T		896	5074		0.18	0.36	1827	0.49
Right	R		589	1583		0.37	1.00	1583	0.37
Southbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru	T		1394	5074	#	0.27	0.36	1827	0.76
Right	R		979	1583		0.62	1.00	1583	0.62

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.62
Total lost time per cycle, L = 13.90 sec

Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.81

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.66	0.41	14.4	1.000	1403	0.23	1.1	0.0	15.5	B		
											19.4	B
R	0.85	0.41	16.0	1.000	646	0.38	10.1	0.0	26.1	C		
Northbound												
T	0.49	0.36	14.9	1.000	1827	0.11	0.2	0.0	15.1	B	9.2	A
R	0.37	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												
T	0.76	0.36	16.9	1.000	1827	0.32	2.0	0.0	18.9	B	11.4	B
R	0.62	1.00	0.0	0.950	1583	0.20	0.7	0.0	0.7	A		

Intersection delay = 13.0 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				

Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT 0.000 0.000
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				

Red time r=(C-g-gq-gu)
Arrival rate, qa=v/(3600(max[X,1.0]))
Protected ph. departure rate, Sp=s/3600
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)
XPerm
XProt
Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	17.7	14.4	0.00	0.0	0.0	15.5
	0.0						0.0	
R	0.0	0.00	17.7	16.0	0.00	0.0	0.0	26.1
Northbound								
	0.0						0.0	
T	0.0	0.00	19.2	14.9	0.00	0.0	0.0	15.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	19.2	16.9	0.00	0.0	0.0	18.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.7

Intersection Delay 13.0 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup			L	R	T	R	T	R	
Init Queue			0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate			474	546	328	589	511	979	
So			1900	1900	1900	1900	1900	1900	
No.Lanes	0	0 0	2 0	1	0 3	1	0 3	1	
SL			1770	1583	1862	1583	1862	1583	
LnCapacity			722	646	670	1583	670	1583	
Flow Ratio			0.3	0.3	0.2	0.4	0.3	0.6	
v/c Ratio			0.66	0.85	0.49	0.37	0.76	0.62	
Grn Ratio			0.41	0.41	0.36	1.00	0.36	1.00	
I Factor			1.000		1.000		1.000		
AT or PVG			3	3	3	3	3	3	
Pltn Ratio			1.00	1.00	1.00	1.00	1.00	1.00	
PF2			1.00	1.00	1.00		1.00		
Q1			6.4	8.2	4.2		7.5		
kB			0.4	0.4	0.4	0.7	0.4	0.7	
Q2			0.8	2.0	0.4	0.4	1.3	1.1	
Q Average			7.2	10.2	4.7		8.8		
Q Spacing			25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage			0	0	0	0	0	0	
Q S Ratio									
70th Percentile Output:									
fB%			1.2	1.2	1.2		1.2		
BOQ			8.5	12.0	5.5		10.4		
QSRatio									
85th Percentile Output:									
fB%			1.5	1.5	1.6		1.5		
BOQ			11.1	15.4	7.2		13.4		
QSRatio									
90th Percentile Output:									
fB%			1.7	1.6	1.7		1.7		
BOQ			12.1	16.7	8.0		14.6		
QSRatio									
95th Percentile Output:									
fB%			1.9	1.8	2.0		1.9		
BOQ			13.7	18.7	9.1		16.4		
QSRatio									

98th Percentile Output:

fB%		2.3	2.2	2.4	2.2
BOQ		16.4	22.0	11.2	19.4
QSRatio					

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 NB Ramps

Inter.: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Volume				477		796		2154	400		1293	690
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right	A	A		
Peds					Peds				
NB Right		A			EB Right				
SB Right		A			WB Right				
Green		50.5	0.0			32.4	15.4	0.0	
Yellow		4.3				4.3	3.6		
All Red		3.5				3.5	2.5		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
Westbound								
L	1446	3437	0.35	0.42	23.7	C		
							110.8	F
R	666	1583	1.26	0.42	162.9	F		
Northbound								
T	2351	5074	0.96	0.46	42.6	D	36.0	D
R	1583	1583	0.27	1.00	0.1	A		
Southbound								
T	2351	5074	0.58	0.46	24.0	C	15.7	B
R	1583	1583	0.46	1.00	0.2	A		

Intersection Delay = 45.4 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 NB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				477		796		2154	400		1293	690
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				126		209		567	105		340	182
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				502		838		2267	421		1361	726
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination 1 2 3 4 | 5 6 7 8

EB Left | NB Left
Thru | Thru A A
Right | Right A A
Peds | Peds

WB Left A | SB Left
Thru | Thru A A
Right A | Right A A
Peds | Peds

NB Right A | EB Right

SB	Right		A				WB	Right			
Green		50.5	0.0					32.4	15.4	0.0	
Yellow		4.3						4.3	3.6		
All Red		3.5						3.5	2.5		

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				477		796		2154	400		1293	690
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				502		838		2267	421		1361	726
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
Lane group				L		R		T	R		T	R
Adj flow				502		838		2267	421		1361	726
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG			L			R		T	R		T	R
So			1900			1900		1900	1900		1900	1900
Lanes	0	0	2	0		1	0	3	1	0	3	1
fW			1.000			1.000		1.000	1.000		1.000	1.000
fHV			0.980			0.980		0.980	0.980		0.980	0.980
fG			1.000			1.000		1.000	1.000		1.000	1.000
fP			1.000			1.000		1.000	1.000		1.000	1.000
fBB			1.000			1.000		1.000	1.000		1.000	1.000
fA			1.000			1.000		1.000	1.000		1.000	1.000
fLU			0.971			1.000		0.908	1.000		0.908	1.000
fRT						0.850		1.000	0.850		1.000	0.850
fLT			0.950					1.000			1.000	
Sec.												
fLpb			1.000					1.000			1.000	
fRpb						1.000		1.000	1.000		1.000	1.000
S			3437			1583		5074	1583		5074	1583
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group		Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru									
Right									
Westbound									
Prot									
Perm									
Left	L		502	3437		0.15	0.42	1446	0.35
Prot									
Perm									
Thru									
Right	R		838	1583	#	0.53	0.42	666	1.26
Northbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru	T		2267	5074	#	0.45	0.46	2351	0.96
Right	R		421	1583		0.27	1.00	1583	0.27
Southbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru	T		1361	5074		0.27	0.46	2351	0.58
Right	R		726	1583		0.46	1.00	1583	0.46

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.98
Total lost time per cycle, L = 13.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.10

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor Del k	d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.35	0.42	23.6	1.000	1446	0.11	0.1	0.0	23.7	C		
											110.8	F
R	1.26	0.42	34.8	1.000	666	0.50	128.2	0.0	162.9	F		
Northbound												
T	0.96	0.46	31.2	1.000	2351	0.47	11.4	0.0	42.6	D	36.0	D
R	0.27	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												
T	0.58	0.46	23.6	1.000	2351	0.17	0.4	0.0	24.0	C	15.7	B
R	0.46	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 45.4 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	120.0 sec			
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				

Cycle length, C 120.0 sec
Total actual green time for LT lane group, G (s)
Effective permitted green time for LT lane group, g(s)
Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT 0.000 0.000
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns
EB WB NB SB
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Pedestrian flow rate, Vpedg (p/h)
OCCpedg
Opposing queue clearing green, gq (s)
Eff. ped. green consumed by opp. veh. queue, gq/gp
OCCpedu
Opposing flow rate, Vo (veh/h)
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion of left turns, PLT
Proportion of left turns using protected phase, PLTA
Left-turn adjustment, fLpb
Permitted Right Turns
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Conflicting bicycle volume, Vbic (bicycles/h)
Vpedg
OCCpedg
Effective green, g (s)
Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

EBLT WBLT NBLT SBLT
Cycle length, C 120.0 sec
Adj. LT vol from Vol Adjustment Worksheet, v
v/c ratio from Capacity Worksheet, X

Protected phase effective green interval, g (s)
Opposing queue effective green interval, gq
Unopposed green interval, gu
Red time r=(C-g-gq-gu)
Arrival rate, qa=v/(3600(max[X,1.0]))
Protected ph. departure rate, Sp=s/3600
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)
XPerm
XProt
Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	34.8	23.6	0.00	0.0	0.0	23.7
	0.0						0.0	
R	0.0	0.00	34.8	34.8	0.00	43.0	0.0	162.9
Northbound								
	0.0						0.0	
T	0.0	0.00	32.2	31.2	0.00	0.0	0.0	42.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	32.2	23.6	0.00	0.0	0.0	24.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 45.4 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup			L	R	T	R	T	R	
Init Queue			0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate			258	838	832	421	499	726	
So			1900	1900	1900	1900	1900	1900	
No.Lanes	0	0 0	2	0 1	0 3	1	0 3	1	
SL			1770	1583	1862	1583	1862	1583	
LnCapacity			744	666	863	1583	863	1583	
Flow Ratio			0.1	0.5	0.4	0.3	0.3	0.5	
v/c Ratio			0.35	1.26	0.96	0.27	0.58	0.46	
Grn Ratio			0.42	0.42	0.46	1.00	0.46	1.00	
I Factor			1.000		1.000		1.000		
AT or PVG			3	3	3	3	3	3	
Pltn Ratio			1.00	1.00	1.00	1.00	1.00	1.00	
PF2			1.00	1.00	1.00		1.00		
Q1			5.8	27.9	26.9		12.2		
kB			0.7	0.6	0.8	1.1	0.8	1.1	
Q2			0.4	24.3	7.1	0.4	1.0	0.9	
Q Average			6.2	52.2	34.0		13.2		
Q Spacing			25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage			0	0	0	0	0	0	
Q S Ratio									
70th Percentile Output:									
fB%			1.2	1.1	1.1		1.2		
BOQ			7.3	58.8	38.9		15.5		
QSRatio									
85th Percentile Output:									
fB%			1.5	1.4	1.4		1.5		
BOQ			9.6	70.6	47.5		19.7		
QSRatio									
90th Percentile Output:									
fB%			1.7	1.4	1.5		1.6		
BOQ			10.5	74.6	50.1		21.2		
QSRatio									
95th Percentile Output:									

fB%		1.9	1.5	1.6	1.8	
BOQ		11.9	80.0	54.1	23.6	
QSRatio						
98th Percentile Output:						
fB%		2.3	1.7	1.8	2.1	
BOQ		14.4	89.7	60.3	27.2	
QSRatio						

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 SB Ramps

Inter.: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	303	0	527					1070	261		1898	251
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	26.4	0.0			3.2	25.7	0.0	
Yellow	3.6				4.3	4.3		
All Red	2.5				2.5	2.5		

Cycle Length: 75.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	623	1770	0.51	0.35	19.9	B		
LTR	656	1863	0.00	0.35	15.7	B	46.3	D
R	557	1583	1.00	0.35	61.4	E		
Westbound								
Northbound								
T	2415	5074	0.47	0.48	13.4	B	10.8	B
R	1583	1583	0.17	1.00	0.1	A		

Southbound

T	2415	5074	0.83	0.48	19.5	B	17.2	B
R	1583	1583	0.17	1.00	0.1	A		

Intersection Delay = 20.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Culver at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	303	0	527					1070	261		1898	251
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	80	0	139					282	69		499	66
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L	LTR	R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	319	0	555					1126	275		1998	264
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		

	Right Peds				Right Peds	A	A	
NB	Right	A		EB	Right			
SB	Right	A		WB	Right			
Green		26.4	0.0			3.2	25.7	0.0
Yellow		3.6				4.3	4.3	
All Red		2.5				2.5	2.5	

Cycle Length: 75.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	303	0	527					1070	261		1898	251
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	319	0	555					1126	275		1998	264
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	319	0	555					1126	275		1998	264
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound	
LG	L	LTR	R				T	R		T	R
So	1900	1900	1900				1900	1900		1900	1900
Lanes	1	1	1	0	0	0	3	1	0	3	1
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fLU	1.000	1.000	1.000				0.908	1.000		0.908	1.000
fRT		1.000	0.850				1.000	0.850		1.000	0.850
fLT	0.950	1.000					1.000			1.000	
Sec.											
fLpb	1.000	1.000					1.000			1.000	
fRpb		1.000	1.000				1.000	1.000		1.000	1.000
S	1770	1863	1583				5074	1583		5074	1583
Sec.											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left	L	319	1770	0.18	0.35	623	0.51
Prot							
Perm							
Thru	LTR	0	1863	0.00	0.35	656	0.00
Right	R	555	1583	# 0.35	0.35	557	1.00
Westbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1126	5074	0.22	0.48	2415	0.47
Right	R	275	1583	0.17	1.00	1583	0.17
Southbound							
Prot							
Perm							
Left							

Prot Perm								
Thru	T	1998	5074	#	0.39	0.48	2415	0.83
Right	R	264	1583		0.17	1.00	1583	0.17

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.74
Total lost time per cycle, L = 12.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.90

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.51	0.35	19.2	1.000	623	0.12	0.7	0.0	19.9	B		
LTR	0.00	0.35	15.7	1.000	656	0.11	0.0	0.0	15.7	B	46.3	D
R	1.00	0.35	24.3	1.000	557	0.50	37.2	0.0	61.4	E		
Westbound												
Northbound												
T	0.47	0.48	13.2	1.000	2415	0.11	0.1	0.0	13.4	B	10.8	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												
T	0.83	0.48	17.0	1.000	2415	0.37	2.5	0.0	19.5	B	17.2	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 20.8 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET

for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET

for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET

Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	75.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	24.3	19.2	0.00	0.0	0.0	19.9
LTR	0.0	0.00	24.3	15.7	0.00	0.0	0.0	15.7
R	0.0	0.00	24.3	24.3	0.00	0.0	0.0	61.4
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	19.6	13.2	0.00	0.0	0.0	13.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	19.6	17.0	0.00	0.0	0.0	19.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 20.8 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup	L	LTR	R				T	R	T	R
Init Queue	0.0	0.0	0.0				0.0	0.0	0.0	0.0
Flow Rate	319	0	555				413	275	733	264
So	1900	1900	1900				1900	1900	1900	1900
No.Lanes	1	1	1	0	0	0	3	1	3	1
SL	1770	1863	1583				1862	1583	1862	1583
LnCapacity	623	656	557				886	1583	886	1583
Flow Ratio	0.2	0.0	0.4				0.2	0.2	0.4	0.2
v/c Ratio	0.51	0.00	1.00				0.47	0.17	0.83	0.17
Grn Ratio	0.35	0.35	0.35				0.48	1.00	0.48	1.00
I Factor		1.000					1.000		1.000	
AT or PVG	3	3	3				3	3	3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00				1.00		1.00	
Q1	5.3	0.0	11.5				5.8		13.2	
kB	0.5	0.5	0.4				0.6	0.8	0.6	0.8
Q2	0.5	0.0	5.4				0.5	0.2	2.4	0.2
Q Average	5.7	0.0	16.9				6.3		15.6	
Q Spacing	25.0	25.0	25.0				25.0	25.0	25.0	25.0
Q Storage	0	0	0				0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2	1.2				1.2		1.2	
BOQ	6.8	0.0	19.7				7.5		18.3	
QSRatio										
85th Percentile Output:										
fB%	1.5	1.6	1.5				1.5		1.5	
BOQ	8.9	0.0	24.9				9.7		23.1	
QSRatio										
90th Percentile Output:										

fB%	1.7	1.8	1.6		1.7	1.6
BOQ	9.8	0.0	26.6		10.6	24.8
QSRatio						
95th Percentile Output:						
fB%	1.9	2.1	1.7		1.9	1.8
BOQ	11.1	0.0	29.3		12.1	27.4
QSRatio						
98th Percentile Output:						
fB%	2.3	2.7	2.0		2.3	2.0
BOQ	13.4	0.0	33.4		14.6	31.3
QSRatio						

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB	Inter.: Culver at I-405 SB Ramps
Agency: Parsons Brinckerhoff	Area Type: All other areas
Date: 11/19/09	Jurisd: Caltrans
Period: PM Peak Hour	Year : P2030
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout	
E/W St: I-405 SB Ramps	N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	965	0	477					1640	731		1326	341
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	51.3	0.0				3.8	25.2	0.0	
Yellow	3.6					4.3	4.3		
All Red	2.5					2.5	2.5		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	908	1770	1.12	0.51	92.5	F		
LTR	956	1863	0.00	0.51	11.9	B	68.1	E
R	812	1583	0.62	0.51	18.8	B		
Westbound								
Northbound								
T	1816	5074	0.95	0.36	42.8	D	29.7	C
R	1583	1583	0.49	1.00	0.2	A		

Southbound

T	1816	5074	0.77	0.36	30.5	C	24.3	C
R	1583	1583	0.23	1.00	0.1	A		

Intersection Delay = 38.2 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Culver at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	965	0	477					1640	731		1326	341
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	254	0	126					432	192		349	90
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L	LTR	R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol		0						0			0	
Adj Flow	1016	0	502					1726	769		1396	359
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		

	Right Peds					Right Peds	A	A	
NB	Right	A			EB	Right			
SB	Right	A			WB	Right			
Green		51.3	0.0				3.8	25.2	0.0
Yellow		3.6					4.3	4.3	
All Red		2.5					2.5	2.5	

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	965	0	477					1640	731		1326	341
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	1016	0	502					1726	769		1396	359
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L	LTR	R					T	R		T	R
Adj flow	1016	0	502					1726	769		1396	359
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound	
LG	L	LTR	R				T	R		T	R
So	1900	1900	1900				1900	1900		1900	1900
Lanes	1	1	1	0	0	0	3	1	0	3	1
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000
fLU	1.000	1.000	1.000				0.908	1.000		0.908	1.000
fRT		1.000	0.850				1.000	0.850		1.000	0.850
fLT	0.950	1.000					1.000			1.000	
Sec.											
fLpb	1.000	1.000					1.000			1.000	
fRpb		1.000	1.000				1.000	1.000		1.000	1.000
S	1770	1863	1583				5074	1583		5074	1583
Sec.											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left	L	1016	1770	# 0.57	0.51	908	1.12
Prot							
Perm							
Thru	LTR	0	1863	0.00	0.51	956	0.00
Right	R	502	1583	0.32	0.51	812	0.62
Westbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1726	5074	# 0.34	0.36	1816	0.95
Right	R	769	1583	0.49	1.00	1583	0.49
Southbound							
Prot							
Perm							
Left							

Prot Perm							
Thru	T	1396	5074	0.28	0.36	1816	0.77
Right	R	359	1583	0.23	1.00	1583	0.23

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.91
Total lost time per cycle, L = 12.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.05

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.12	0.51	24.3	1.000	908	0.50	68.2	0.0	92.5	F		
LTR	0.00	0.51	11.9	1.000	956	0.11	0.0	0.0	11.9	B	68.1	E
R	0.62	0.51	17.4	1.000	812	0.20	1.4	0.0	18.8	B		
Westbound												
Northbound												
T	0.95	0.36	31.2	1.000	1816	0.46	11.6	0.0	42.8	D	29.7	C
R	0.49	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												
T	0.77	0.36	28.4	1.000	1816	0.32	2.1	0.0	30.5	C	24.3	C
R	0.23	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 38.2 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET

for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET

Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	100.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	24.3	24.3	0.00	27.0	0.0	92.5
LTR	0.0	0.00	24.3	11.9	0.00	0.0	0.0	11.9
R	0.0	0.00	24.3	17.4	0.00	0.0	0.0	18.8
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	32.1	31.2	0.00	0.0	0.0	42.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	32.1	28.4	0.00	0.0	0.0	30.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 38.2 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup	L	LTR	R				T	R	T	R
Init Queue	0.0	0.0	0.0				0.0	0.0	0.0	0.0
Flow Rate	1016	0	502				633	769	512	359
So	1900	1900	1900				1900	1900	1900	1900
No.Lanes	1	1	1	0	0	0	3	1	3	1
SL	1770	1863	1583				1862	1583	1862	1583
LnCapacity	908	956	812				666	1583	666	1583
Flow Ratio	0.6	0.0	0.3				0.3	0.5	0.3	0.2
v/c Ratio	1.12	0.00	0.62				0.95	0.49	0.77	0.23
Grn Ratio	0.51	0.51	0.51				0.36	1.00	0.36	1.00
I Factor		1.000					1.000		1.000	
AT or PVG	3	3	3				3	3	3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00				1.00		1.00	
Q1	28.2	0.0	9.9				17.1		12.6	
kB	0.7	0.7	0.6				0.6	1.0	0.6	1.0
Q2	18.3	0.0	1.0				5.0	0.9	1.8	0.3
Q Average	46.5	0.0	11.0				22.1		14.4	
Q Spacing	25.0	25.0	25.0				25.0	25.0	25.0	25.0
Q Storage	0	0	0				0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.1	1.2	1.2				1.2		1.2	
BOQ	52.6	0.0	12.9				25.6		16.8	
QSRatio										
85th Percentile Output:										
fB%	1.4	1.6	1.5				1.4		1.5	
BOQ	63.5	0.0	16.5				31.9		21.3	
QSRatio										
90th Percentile Output:										

fB%	1.4 1.8 1.6		1.5	1.6	
BOQ	67.0 0.0 17.9		33.9	22.9	
QSRatio					
95th Percentile Output:					
fB%	1.5 2.1 1.8		1.7	1.8	
BOQ	71.9 0.0 20.0		37.0	25.4	
QSRatio					
98th Percentile Output:					
fB%	1.7 2.7 2.1		1.9	2.0	
BOQ	80.4 0.0 23.4		41.6	29.2	
QSRatio					

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 NB Ramps

Inter.: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Volume				1438		1092		2078	600		1972	1700
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right	A	A		
Peds					Peds				
NB Right		A			EB Right				
SB Right		A			WB Right	A	A		
Green		21.8	0.0			6.3	18.9	0.0	
Yellow		3.6				4.7	4.7		
All Red		2.0				1.5	1.5		

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1617	4820	0.94	0.34	31.7	C		
							18.7	B
R	1583	1583	0.73	1.00	1.7	A		
Northbound								
T	2451	5074	0.89	0.48	19.9	B	15.5	B
R	1583	1583	0.40	1.00	0.2	A		

Southbound

T	3268	6765	0.64	0.48	12.9	B	38.0	D
R	1583	1583	1.13	1.00	67.2	E		

Intersection Delay = 25.7 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1438		1092		2078	600		1972	1700
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				378		287		547	158		519	447
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				1514		1149		2187	632		2076	1789
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		

	Right Peds	A			Right Peds	A	A		
NB	Right	A		EB	Right				
SB	Right	A		WB	Right	A	A		
Green		21.8	0.0			6.3	18.9	0.0	
Yellow		3.6				4.7	4.7		
All Red		2.0				1.5	1.5		

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1438		1092		2078	600		1972	1700
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				1514		1149		2187	632		2076	1789
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
Lane group				L		R		T	R		T	R
Adj flow				1514		1149		2187	632		2076	1789
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T	R		T	R	
So			1900		1900		1900	1900		1900	1900	
Lanes	0	0	3	0	1	0	3	1	0	4	1	
fW			1.000		1.000		1.000	1.000		1.000	1.000	
fHV			0.980		0.980		0.980	0.980		0.980	0.980	
fG			1.000		1.000		1.000	1.000		1.000	1.000	
fP			1.000		1.000		1.000	1.000		1.000	1.000	
fBB			1.000		1.000		1.000	1.000		1.000	1.000	
fA			1.000		1.000		1.000	1.000		1.000	1.000	
fLU			0.908		1.000		0.908	1.000		0.908	1.000	
fRT					0.850		1.000	0.850		1.000	0.850	
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000	1.000		1.000	1.000	
S			4820		1583		5074	1583		6765	1583	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Westbound							
Prot							
Perm							
Left	L	1514	4820	0.31	0.34	1617	0.94
Prot							
Perm							
Thru							
Right	R	1149	1583	0.73	1.00	1583	0.73
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	2187	5074	0.43	0.48	2451	0.89
Right	R	632	1583	0.40	1.00	1583	0.40
Southbound							
Prot							
Perm							
Left							

Prot Perm Thru	T	2076	6765	0.31	0.48	3268	0.64
Right	R	1789	1583	# 1.13	1.00	1583	1.13

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.13
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.13

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.94	0.34	20.9	1.000	1617	0.45	10.7	0.0	31.7	C		
											18.7	B
R	0.73	1.00	0.0	0.950	1583	0.29	1.7	0.0	1.7	A		
Northbound												
T	0.89	0.48	15.3	1.000	2451	0.42	4.6	0.0	19.9	B	15.5	B
R	0.40	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												
T	0.64	0.48	12.5	1.000	3268	0.22	0.4	0.0	12.9	B	38.0	D
R	1.13	1.00	0.0	0.950	1583	0.50	67.2	0.0	67.2	E		

Intersection delay = 25.7 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET

for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET

for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET

Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	21.6	20.9	0.00	0.0	0.0	31.7
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.7
Northbound								
	0.0						0.0	
T	0.0	0.00	16.8	15.3	0.00	0.0	0.0	19.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	16.8	12.5	0.00	0.0	0.0	12.9
R	0.0	0.00	0.0	0.0	0.00	51.5	0.0	67.2

Intersection Delay 25.7 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

LaneGroup	Eastbound	Westbound L	Westbound R	Northbound T	Northbound R	Southbound T	Southbound R
Init Queue		0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate		555	1149	802	632	571	1789
So		1900	1900	1900	1900	1900	1900
No.Lanes	0 0 0	3 0	1	0 3	1	0 4	1
SL		1769	1583	1862	1583	1862	1583
LnCapacity		593	1583	899	1583	899	1583
Flow Ratio		0.3	0.7	0.4	0.4	0.3	1.1
v/c Ratio		0.94	0.73	0.89	0.40	0.64	1.13
Grn Ratio		0.34	1.00	0.48	1.00	0.48	1.00
I Factor		1.000		1.000		1.000	
AT or PVG		3	3	3	3	3	3
Pltn Ratio		1.00	1.00	1.00	1.00	1.00	1.00
PF2		1.00		1.00		1.00	
Q1		9.7		13.2		7.7	
kB		0.4	0.7	0.5	0.7	0.5	0.7
Q2		3.5	1.9	3.4	0.5	0.9	31.1
Q Average		13.2		16.6		8.6	
Q Spacing		25.0	25.0	25.0	25.0	25.0	25.0
Q Storage		0	0	0	0	0	0
Q S Ratio							
70th Percentile Output:							
fB%		1.2		1.2		1.2	
BOQ		15.5		19.3		10.1	
QSRatio							
85th Percentile Output:							
fB%		1.5		1.5		1.5	
BOQ		19.7		24.4		13.1	
QSRatio							
90th Percentile Output:							

fB%		1.6	1.6	1.7	
BOQ		21.2	26.1	14.3	
QSRatio					
95th Percentile Output:					
fB%		1.8	1.7	1.9	
BOQ		23.6	28.8	16.1	
QSRatio					
98th Percentile Output:					
fB%		2.1	2.0	2.2	
BOQ		27.2	32.8	19.0	
QSRatio					

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 NB Ramps

Inter.: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
LGConfig				L		R		T	R		T	R
Volume				768		244		3650	1131		2736	1221
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left	A				SB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right	A	A		
Green	29.4	0.0				74.8	7.8	0.0	
Yellow	3.6					4.7	4.7		
All Red	2.0					1.5	1.5		

Cycle Length: 130.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1090	4820	0.74	0.23	49.5	D		
							37.6	D
R	1583	1583	0.16	1.00	0.0+	A		
Northbound								

```
T        3466      5074      1.11   0.68    74.2   E    57.2   E
R        1583      1583      0.75   1.00    2.1    A
Southbound

T        4621      6765      0.62   0.68    11.6   B    9.1    A
R        1583      1583      0.81   1.00    3.3    A
         Intersection Delay = 35.6  (sec/veh)   Intersection LOS = D
```

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Jamboree at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				768		244		3650	1131		2736	1221
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				202		64		961	298		720	321
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		3	0 1		0	3 1		0	4 1
LGConfig				L		R			T R			T R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				808		257		3842	1191		2880	1285
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				

WB	Left	A		SB	Left			
	Thru				Thru	A	A	
	Right	A			Right	A	A	
	Peds				Peds			
NB	Right	A		EB	Right			
SB	Right	A		WB	Right	A	A	
Green		29.4	0.0			74.8	7.8	0.0
Yellow		3.6				4.7	4.7	
All Red		2.0				1.5	1.5	

Cycle Length: 130.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				768		244		3650	1131		2736	1221
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				808		257		3842	1191		2880	1285
No. Lanes	0	0	0	3	0	1	0	3	1	0	4	1
Lane group				L		R		T	R		T	R
Adj flow				808		257		3842	1191		2880	1285
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R		T	R		T	R
So				1900		1900		1900	1900		1900	1900
Lanes	0	0	0	3	0	1	0	3	1	0	4	1
fW				1.000		1.000		1.000	1.000		1.000	1.000
fHV				0.980		0.980		0.980	0.980		0.980	0.980
fG				1.000		1.000		1.000	1.000		1.000	1.000
fP				1.000		1.000		1.000	1.000		1.000	1.000
fBB				1.000		1.000		1.000	1.000		1.000	1.000
fA				1.000		1.000		1.000	1.000		1.000	1.000
fLU				0.908		1.000		0.908	1.000		0.908	1.000
fRT						0.850		1.000	0.850		1.000	0.850
fLT				0.950				1.000			1.000	
Sec.												
fLpb				1.000				1.000			1.000	
fRpb						1.000		1.000	1.000		1.000	1.000
S				4820		1583		5074	1583		6765	1583
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	808	4820	#	0.17	0.23	1090	0.74
Prot								
Perm								
Thru								
Right	R	257	1583		0.16	1.00	1583	0.16
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	3842	5074	#	0.76	0.68	3466	1.11
Right	R	1191	1583		0.75	1.00	1583	0.75
Southbound								
Prot								

Perm Left Prot Perm Thru	T	2880	6765	0.43	0.68	4621	0.62
Right	R	1285	1583	0.81	1.00	1583	0.81

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.92
Total lost time per cycle, L = 11.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.02

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.74	0.23	46.8	1.000	1090	0.30	2.8	0.0	49.5	D		
											37.6	D
R	0.16	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Northbound												
T	1.11	0.68	20.6	1.000	3466	0.50	53.6	0.0	74.2	E	57.2	E
R	0.75	1.00	0.0	0.950	1583	0.31	2.1	0.0	2.1	A		
Southbound												
T	0.62	0.68	11.4	1.000	4621	0.21	0.3	0.0	11.6	B	9.1	A
R	0.81	1.00	0.0	0.950	1583	0.35	3.3	0.0	3.3	A		

Intersection delay = 35.6 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 130.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 130.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET

Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	130.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	50.3	46.8	0.00	0.0	0.0	49.5
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Northbound								
	0.0						0.0	
T	0.0	0.00	20.6	20.6	0.00	94.0	0.0	74.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.1
Southbound								
	0.0						0.0	
T	0.0	0.00	20.6	11.4	0.00	0.0	0.0	11.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	3.3

Intersection Delay 35.6 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup			L		R	T	R	T	R
Init Queue			0.0		0.0	0.0	0.0	0.0	0.0
Flow Rate			296		257	1410	1191	792	1285
So			1900		1900	1900	1900	1900	1900
No.Lanes	0	0	3	0	1	3	1	4	1
SL			1769		1583	1862	1583	1862	1583
LnCapacity			400		1583	1272	1583	1272	1583
Flow Ratio			0.2		0.2	0.8	0.8	0.4	0.8
v/c Ratio			0.74		0.16	1.11	0.75	0.62	0.81
Grn Ratio			0.23		1.00	0.68	1.00	0.68	1.00
I Factor			1.000			1.000		1.000	
AT or PVG			3		3	3	3	3	3
Pltn Ratio			1.00		1.00	1.00	1.00	1.00	1.00
PF2			1.00			1.00		1.00	
Q1			9.9			50.9		15.8	
kB			0.5		1.1	1.0	1.1	1.0	1.1
Q2			1.3		0.2	24.4	3.2	1.6	4.4
Q Average			11.2			75.3		17.4	
Q Spacing			25.0		25.0	25.0	25.0	25.0	25.0
Q Storage			0		0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%			1.2			1.1		1.2	
BOQ			13.2			84.0		20.2	
QSRatio									
85th Percentile Output:									
fB%			1.5			1.3		1.5	
BOQ			16.9			99.8		25.5	

QSRatio					
90th Percentile Output:					
fB%		1.6	1.4	1.6	
BOQ		18.3	106	27.2	
QSRatio					
95th Percentile Output:					
fB%		1.8	1.5	1.7	
BOQ		20.4	114	30.0	
QSRatio					
98th Percentile Output:					
fB%		2.1	1.7	2.0	
BOQ		23.8	128	34.1	
QSRatio					

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 SB Ramps

Inter.: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Volume	845	0	2085					1828	601		3101	280
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	61.2	0.0			32.2	18.2	0.0	
Yellow	3.5				4.7	4.7		
All Red	1.5				2.0	2.0		

Cycle Length: 130.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	833	1770	1.07	0.47	85.1	F		
LTR	877	1863	0.00	0.47	18.2	B	263.7	F
R	1320	2803	1.66	0.47	336.1	F		
Westbound								
Northbound								

```
T        2971      6765      0.65   0.44    29.1   C    21.9   C
R        1583      1583      0.40   1.00    0.2    A
Southbound

T        2971      6765      1.10   0.44    86.8   F    79.6   E
R        1583      1583      0.19   1.00    0.1    A
         Intersection Delay = 125.3 (sec/veh)   Intersection LOS = F
```

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	845	0	2085					1828	601		3101	280
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	222	0	549					481	158		816	74
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	889	0	2195					1924	633		3264	295
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				

WB	Left			SB	Left		
	Thru				Thru	A	A
	Right				Right	A	A
	Peds				Peds		
NB	Right	A		EB	Right		
SB	Right	A		WB	Right		
Green		61.2	0.0			32.2	18.2 0.0
Yellow		3.5				4.7	4.7
All Red		1.5				2.0	2.0

Cycle Length: 130.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	845	0	2085					1828	601		3101	280
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	889	0	2195					1924	633		3264	295
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	889	0	2195					1924	633		3264	295
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				T	R		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	2	0	0	0	4	1	0	4	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	0.885				0.908	1.000		0.908	1.000	
fRT		1.000	0.850				1.000	0.850		1.000	0.850	
fLT	0.950	1.000					1.000			1.000		
Sec.												
fLpb	1.000	1.000					1.000			1.000		
fRpb		1.000	1.000				1.000	1.000		1.000	1.000	
S	1770	1863	2803				6765	1583		6765	1583	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	889	1770		0.50	0.47	833	1.07
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.47	877	0.00
Right	R	2195	2803	#	0.78	0.47	1320	1.66
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1924	6765		0.28	0.44	2971	0.65
Right	R	633	1583		0.40	1.00	1583	0.40
Southbound								

Prot Perm Left								
Prot Perm Thru	T	3264	6765	# 0.48	0.44	2971	1.10	
Right	R	295	1583	0.19	1.00	1583	0.19	

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.27
Total lost time per cycle, L = 11.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.39

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.07	0.47	34.4	1.000	833	0.50	50.7	0.0	85.1	F		
LTR	0.00	0.47	18.2	1.000	877	0.11	0.0	0.0	18.2	B	263.7	F
R	1.66	0.47	34.4	1.000	1320	0.50	301.7	0.0	336.1	F		
Westbound												
Northbound												
T	0.65	0.44	28.6	1.000	2971	0.23	0.5	0.0	29.1	C	21.9	C
R	0.40	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												
T	1.10	0.44	36.4	1.000	2971	0.50	50.3	0.0	86.8	F	79.6	E
R	0.19	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 125.3 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	130.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach

or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 130.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C = 130.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	34.4	34.4	0.00	14.0	0.0	85.1
LTR	0.0	0.00	34.4	18.2	0.00	0.0	0.0	18.2
R	0.0	0.00	34.4	34.4	0.00	218.7	0.0	336.1
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	36.4	28.6	0.00	0.0	0.0	29.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	36.4	36.4	0.00	73.2	0.0	86.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 125.3 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup	L	LTR	R				T	R	T	R
Init Queue	0.0	0.0	0.0				0.0	0.0	0.0	0.0
Flow Rate	889	0	1240				529	633	898	295
So	1900	1900	1900				1900	1900	1900	1900
No.Lanes	1	1	2	0	0	0	0	4	1	0	4	1
SL	1770	1863	1584				1862	1583	1862	1583
LnCapacity	833	877	745				818	1583	818	1583
Flow Ratio	0.5	0.0	0.8				0.3	0.4	0.5	0.2
v/c Ratio	1.07	0.00	1.66				0.65	0.40	1.10	0.19
Grn Ratio	0.47	0.47	0.47				0.44	1.00	0.44	1.00
I Factor		1.000					1.000		1.000	
AT or PVG	3	3	3				3	3	3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00				1.00		1.00	
Q1	32.1	0.0	44.8				15.0		32.4	
kB	0.8	0.8	0.7				0.8	1.1	0.8	1.1
Q2	13.4	0.0	63.6				1.3	0.8	15.5	0.3
Q Average	45.5	0.0	108.4				16.3		47.9	
Q Spacing	25.0	25.0	25.0				25.0	25.0	25.0	25.0
Q Storage	0	0	0				0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.1	1.2	1.1				1.2		1.1	
BOQ	51.5	0.0	120				19.0		54.2	
QSRatio										
85th Percentile Output:										
fB%	1.4	1.6	1.3				1.5		1.4	

BOQ	62.1	0.0	142		24.0	65.2
QSRatio						
90th Percentile Output:						
fB%	1.4	1.8	1.4		1.6	1.4
BOQ	65.6	0.0	152		25.7	68.9
QSRatio						
95th Percentile Output:						
fB%	1.5	2.1	1.5		1.7	1.5
BOQ	70.4	0.0	163		28.4	73.9
QSRatio						
98th Percentile Output:						
fB%	1.7	2.7	1.7		2.0	1.7
BOQ	78.7	0.0	184		32.4	82.7
QSRatio						

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 SB Ramps

Inter.: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Volume	1406	0	1184					3314	1160		3026	710
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		55.3	0.0			37.5	18.8	0.0
Yellow		3.5				4.7	4.7	
All Red		1.5				2.0	2.0	

Cycle Length: 130.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	753	1770	1.97	0.43	476.6	F		
LTR	792	1863	0.00	0.43	21.5	C	293.5	F
R	1192	2803	1.05	0.43	76.1	E		
Westbound								
Northbound								

```
T        3278      6765      1.06   0.48    69.6   E    52.2   D
R        1583      1583      0.77   1.00    2.4    A
Southbound

T        3278      6765      0.97   0.48    42.7   D    34.6   C
R        1583      1583      0.47   1.00    0.2    A
         Intersection Delay = 104.0 (sec/veh)   Intersection LOS = F
```

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Jamboree at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	1406	0	1184					3314	1160		3026	710
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	370	0	312					872	305		796	187
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	1480	0	1246					3488	1221		3185	747
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				

WB	Left			SB	Left			
	Thru				Thru	A	A	
	Right				Right	A	A	
	Peds				Peds			
NB	Right	A		EB	Right			
SB	Right	A		WB	Right			
Green		55.3	0.0			37.5	18.8	0.0
Yellow		3.5				4.7	4.7	
All Red		1.5				2.0	2.0	

Cycle Length: 130.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	1406	0	1184					3314	1160		3026	710
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	1480	0	1246					3488	1221		3185	747
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	1480	0	1246					3488	1221		3185	747
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				T	R		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	2	0	0	0	4	1	0	4	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	0.885				0.908	1.000		0.908	1.000	
fRT		1.000	0.850				1.000	0.850		1.000	0.850	
fLT	0.950	1.000					1.000			1.000		
Sec.												
fLpb	1.000	1.000					1.000			1.000		
fRpb		1.000	1.000				1.000	1.000		1.000	1.000	
S	1770	1863	2803				6765	1583		6765	1583	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	1480	1770	#	0.84	0.43	753	1.97
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.43	792	0.00
Right	R	1246	2803		0.44	0.43	1192	1.05
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	3488	6765	#	0.52	0.48	3278	1.06
Right	R	1221	1583		0.77	1.00	1583	0.77
Southbound								

Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	3185	6765	0.47	0.48	3278	0.97
Right	R	747	1583	0.47	1.00	1583	0.47

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.35
Total lost time per cycle, L = 11.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.49

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.97	0.43	37.3	1.000	753	0.50	439.3	0.0	476.6	F		
LTR	0.00	0.43	21.5	1.000	792	0.11	0.0	0.0	21.5	C	293.5	F
R	1.05	0.43	37.3	1.000	1192	0.50	38.7	0.0	76.1	E		
Westbound												
Northbound												
T	1.06	0.48	33.5	1.000	3278	0.50	36.1	0.0	69.6	E	52.2	D
R	0.77	1.00	0.0	0.950	1583	0.32	2.4	0.0	2.4	A		
Southbound												
T	0.97	0.48	32.6	1.000	3278	0.48	10.1	0.0	42.7	D	34.6	C
R	0.47	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 104.0 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	130.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach

or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 130.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	130.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	37.3	37.3	0.00	181.8	0.0	476.6
LTR	0.0	0.00	37.3	21.5	0.00	0.0	0.0	21.5
R	0.0	0.00	37.3	37.3	0.00	13.5	0.0	76.1
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	33.5	33.5	0.00	52.5	0.0	69.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.4
Southbound								
	0.0						0.0	
T	0.0	0.00	33.5	32.6	0.00	0.0	0.0	42.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 104.0 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup	L	LTR	R				T	R	T	R
Init Queue	0.0	0.0	0.0				0.0	0.0	0.0	0.0
Flow Rate	1480	0	703				960	1221	876	747
So	1900	1900	1900				1900	1900	1900	1900
No.Lanes	1	1	2	0	0	0	0 4	1	0 4	1
SL	1770	1863	1584				1862	1583	1862	1583
LnCapacity	753	792	673				902	1583	902	1583
Flow Ratio	0.8	0.0	0.4				0.5	0.8	0.5	0.5
v/c Ratio	1.97	0.00	1.04				1.06	0.77	0.97	0.47
Grn Ratio	0.43	0.43	0.43				0.48	1.00	0.48	1.00
I Factor		1.000					1.000		1.000	
AT or PVG	3	3	3				3	3	3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00				1.00		1.00	
Q1	53.4	0.0	25.4				34.7		30.8	
kB	0.7	0.7	0.7				0.8	1.1	0.8	1.1
Q2	92.3	0.0	9.8				14.1	3.5	7.9	1.0
Q Average	145.8		0.0	35.2				48.8		38.7
Q Spacing	25.0	25.0	25.0				25.0	25.0	25.0	25.0
Q Storage	0	0	0				0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.1	1.2	1.1				1.1		1.1	
BOQ	161	0.0	40.2				55.1		44.1	
QSRatio										
85th Percentile Output:										
fB%	1.3	1.6	1.4				1.4		1.4	

BOQ	190	0.0	49.0				66.3		53.5		
QSRatio											
90th Percentile Output:											
fB%	1.4	1.8	1.5				1.4		1.5		
BOQ	204	0.0	51.7				70.0		56.4		
QSRatio											
95th Percentile Output:											
fB%	1.5	2.1	1.6				1.5		1.6		
BOQ	219	0.0	55.8				75.1		60.8		
QSRatio											
98th Percentile Output:											
fB%	1.7	2.7	1.8				1.7		1.8		
BOQ	248	0.0	62.2				84.1		67.8		
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Volume				1077		764		2421	235	225	1608	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
WB Left		A			SB Left	A			
Thru					Thru	A	A	A	
Right		A			Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green		32.6	0.0			7.2	3.7	28.1	0.0
Yellow		3.6				3.2	4.3	4.3	
All Red		2.0				2.0	2.0	2.0	

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1179	3437	0.96	0.34	48.4	D		
							42.9	D
R	962	2803	0.84	0.34	35.2	D		

Northbound

T	2713	6765	0.94	0.40	34.7	C	33.3	C
R	1124	2803	0.22	0.40	18.8	B		
Southbound								
L	260	3437	0.91	0.08	77.0	E		
T	3596	6765	0.47	0.53	14.0	B	21.7	C

Intersection Delay = 32.7 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Macarthur at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1077		764		2421	235	225	1608	
% Heavy Veh				2		2		2	2	2	2	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol				283		201		637	62	59	423	
Hi Ln Vol												
% Grade				0				0			0	
Ideal Sat				1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			
Adj Flow				1134		804		2548	247	237	1693	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000	0.000		
Peds Bikes	0			0			0					
Buses				0		0		0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type				3		3		3	3	3	3	
Unit Ext.				3.0		3.0		3.0	3.0	3.0	3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g				2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru		A	A	
Right					Right		A	A	

	Peds					Peds			
WB	Left	A			SB	Left	A		
	Thru					Thru	A	A	A
	Right	A				Right			
	Peds					Peds			
NB	Right				EB	Right			
SB	Right				WB	Right			
Green		32.6	0.0				7.2	3.7	28.1	0.0
Yellow		3.6					3.2	4.3	4.3	
All Red		2.0					2.0	2.0	2.0	

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1077	764		2421	235		225	1608	
PHF				0.95	0.95		0.95	0.95		0.95	0.95	
Adj flow				1134	804		2548	247		237	1693	
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
Lane group				L		R		T	R	L	T	
Adj flow				1134		804		2548	247	237	1693	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound				Southbound			
LG				L		R			T	R		L	T	
So				1900		1900			1900	1900		1900	1900	
Lanes	0	0	0	2	0	2	0		4	2		2	4	0
fW				1.000		1.000			1.000	1.000		1.000	1.000	
fHV				0.980		0.980			0.980	0.980		0.980	0.980	
fG				1.000		1.000			1.000	1.000		1.000	1.000	
fP				1.000		1.000			1.000	1.000		1.000	1.000	
fBB				1.000		1.000			1.000	1.000		1.000	1.000	
fA				1.000		1.000			1.000	1.000		1.000	1.000	
fLU				0.971		0.885			0.908	0.885		0.971	0.908	
fRT						0.850			1.000	0.850			1.000	
fLT				0.950					1.000			0.950	1.000	
Sec.														
fLpb				1.000					1.000			1.000	1.000	
fRpb						1.000			1.000	1.000			1.000	
S				3437		2803			6765	2803		3437	6765	
Sec.														

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	1134	3437	#	0.33	0.34	1179	0.96
Prot								
Perm								
Thru								
Right	R	804	2803		0.29	0.34	962	0.84
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2548	6765	#	0.38	0.40	2713	0.94
Right	R	247	2803		0.09	0.40	1124	0.22

Southbound								
Prot								
Perm								
Left	L	237	3437	# 0.07	0.08	260	0.91	
Prot								
Perm								
Thru	T	1693	6765	0.25	0.53	3596	0.47	
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.78
Total lost time per cycle, L = 17.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.95

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.96	0.34	30.6	1.000	1179	0.47	17.8	0.0	48.4	D		
											42.9	D
R	0.84	0.34	28.7	1.000	962	0.37	6.5	0.0	35.2	D		
Northbound												
T	0.94	0.40	27.3	1.000	2713	0.45	7.3	0.0	34.7	C	33.3	C
R	0.22	0.40	18.7	1.000	1124	0.11	0.1	0.0	18.8	B		
Southbound												
L	0.91	0.08	43.6	1.000	260	0.43	33.4	0.0	77.0	E		
T	0.47	0.53	13.9	1.000	3596	0.11	0.1	0.0	14.0	B	21.7	C

Intersection delay = 32.7 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				

Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	31.2	30.6	0.00	0.0	0.0	48.4
	0.0						0.0	
R	0.0	0.00	31.2	28.7	0.00	0.0	0.0	35.2
Northbound								
	0.0						0.0	
T	0.0	0.00	28.5	27.3	0.00	0.0	0.0	34.7
R	0.0	0.00	28.5	18.7	0.00	0.0	0.0	18.8
Southbound								
L	0.0	0.00	43.9	43.6	0.00	0.0	0.0	77.0
T	0.0	0.00	22.3	13.9	0.00	0.0	0.0	14.0
	0.0						0.0	

Intersection Delay 32.7 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

LaneGroup	Eastbound			Westbound		Northbound			Southbound		
Init Queue				L 0.0	R 0.0	T 0.0	R 0.0	L 0.0	T 0.0		
Flow Rate				583	454	701	139	122	466		
So				1900	1900	1900	1900	1900	1900		
No.Lanes	0	0	0	2	0 2	0 4	2	2	4	0	
SL				1770	1584	1862	1584	1770	1862		
LnCapacity				607	543	746	635	133	990		
Flow Ratio				0.3	0.3	0.4	0.1	0.1	0.3		
v/c Ratio				0.96	0.84	0.94	0.22	0.92	0.47		
Grn Ratio				0.34	0.34	0.40	0.40	0.08	0.53		
I Factor				1.000		1.000			1.000		
AT or PVG				3	3	3	3	3	3		
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00		
PF2				1.00	1.00	1.00	1.00	1.00	1.00		
Q1				15.1	11.0	17.8	2.4	3.2	7.7		
kB				0.5	0.5	0.6	0.5	0.2	0.7		
Q2				4.9	2.1	5.0	0.2	1.2	0.6		
Q Average				20.0	13.2	22.7	2.6	4.4	8.3		
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0		
Q Storage				0	0	0	0	0	0		
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2	1.2	1.2	1.2	1.2		
BOQ				23.2	15.4	26.3	3.1	5.3	9.8		
QSRatio											
85th Percentile Output:											

fB%		1.5	1.5		1.4	1.6	1.6	1.5			
BOQ		29.0	19.6		32.8	4.0	6.9	12.7			
QSRatio											
90th Percentile Output:											
fB%		1.5	1.6		1.5	1.8	1.7	1.7			
BOQ		30.9	21.1		34.7	4.5	7.6	13.8			
QSRatio											
95th Percentile Output:											
fB%		1.7	1.8		1.7	2.0	2.0	1.9			
BOQ		33.9	23.5		38.0	5.2	8.7	15.6			
QSRatio											
98th Percentile Output:											
fB%		1.9	2.1		1.9	2.5	2.4	2.2			
BOQ		38.2	27.1		42.6	6.5	10.7	18.5			
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Volume				618		302		2278	1019	641	2002	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
WB Left		A			SB Left	A		
Thru					Thru	A	A	A
Right		A			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		16.8	0.0			18.7	6.6	24.5 0.0
Yellow		3.6				3.2	4.3	4.3
All Red		2.0				2.0	2.0	2.0

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Flow	Sat Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound									
Westbound									

L	642	3437	1.01	0.19	75.7	E		
							62.5	E
R	523	2803	0.61	0.19	35.6	D		
Northbound								
T	2811	6765	0.85	0.42	26.6	C	29.7	C
R	1165	2803	0.92	0.42	36.8	D		
Southbound								
L	714	3437	0.95	0.21	56.5	E		
T	4608	6765	0.46	0.68	6.7	A	18.8	B

Intersection Delay = 29.9 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Macarthur at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				618		302		2278	1019	641	2002	
% Heavy Veh				2		2		2	2	2	2	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol				163		79		599	268	169	527	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			
Adj Flow				651		318		2398	1073	675	2107	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	
Peds Bikes	0			0			0					
Buses				0		0		0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type				3		3		3	3	3	3	
Unit Ext.				3.0		3.0		3.0	3.0	3.0	3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g				2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8

EB	Left				NB	Left					
	Thru					Thru		A	A		
	Right					Right		A	A		
	Peds					Peds					
WB	Left		A		SB	Left	A				
	Thru					Thru	A	A	A		
	Right		A			Right					
	Peds					Peds					
NB	Right				EB	Right					
SB	Right				WB	Right					
Green		16.8	0.0				18.7	6.6	24.5	0.0	
Yellow		3.6					3.2	4.3	4.3		
All Red		2.0					2.0	2.0	2.0		

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				618		302		2278	1019	641	2002	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow				651		318		2398	1073	675	2107	
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
Lane group				L		R		T	R	L	T	
Adj flow				651		318		2398	1073	675	2107	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R		T	R	L	T	
So				1900		1900		1900	1900	1900	1900	
Lanes	0	0	0	2	0	2	0	4	2	2	4	0
fW				1.000		1.000		1.000	1.000	1.000	1.000	
fHV				0.980		0.980		0.980	0.980	0.980	0.980	
fG				1.000		1.000		1.000	1.000	1.000	1.000	
fP				1.000		1.000		1.000	1.000	1.000	1.000	
fBB				1.000		1.000		1.000	1.000	1.000	1.000	
fA				1.000		1.000		1.000	1.000	1.000	1.000	
fLU				0.971		0.885		0.908	0.885	0.971	0.908	
fRT						0.850		1.000	0.850		1.000	
fLT				0.950				1.000		0.950	1.000	
Sec.												
fLpb				1.000				1.000		1.000	1.000	
fRpb						1.000		1.000	1.000		1.000	
S				3437		2803		6765	2803	3437	6765	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group		Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru									
Right									
Westbound									
Prot									
Perm									
Left	L		651	3437	#	0.19	0.19	642	1.01
Prot									
Perm									
Thru									
Right	R		318	2803		0.11	0.19	523	0.61
Northbound									
Prot									
Perm									
Left									
Prot									

Perm							
Thru	T	2398	6765	0.35	0.42	2811	0.85
Right	R	1073	2803	# 0.38	0.42	1165	0.92
Southbound							
Prot							
Perm							
Left	L	675	3437	# 0.20	0.21	714	0.95
Prot							
Perm							
Thru	T	2107	6765	0.31	0.68	4608	0.46
Right							

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.77
Total lost time per cycle, L = 17.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.95

Control Delay and LOS Determination

Appr/ Lane	Ratios		Unf Del	Prog Adj	Lane Grp	Incremental Factor Del		Res Del	Lane Group		Approach	
Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
Westbound												
L	1.01	0.19	36.6	1.000	642	0.50	39.1	0.0	75.7	E		
											62.5	E
R	0.61	0.19	33.6	1.000	523	0.19	2.1	0.0	35.6	D		
Northbound												
T	0.85	0.42	23.8	1.000	2811	0.39	2.8	0.0	26.6	C	29.7	C
R	0.92	0.42	24.9	1.000	1165	0.44	11.8	0.0	36.8	D		
Southbound												
L	0.95	0.21	35.1	1.000	714	0.46	21.4	0.0	56.5	E		
T	0.46	0.68	6.6	1.000	4608	0.11	0.1	0.0	6.7	A	18.8	B

Intersection delay = 29.9 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				

ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 90.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	36.6	36.6	0.00	2.2	0.0	75.7
	0.0						0.0	
R	0.0	0.00	36.6	33.6	0.00	0.0	0.0	35.6
Northbound								
	0.0						0.0	
T	0.0	0.00	26.3	23.8	0.00	0.0	0.0	26.6
R	0.0	0.00	26.3	24.9	0.00	0.0	0.0	36.8
Southbound								
L	0.0	0.00	35.7	35.1	0.00	0.0	0.0	56.5
T	0.0	0.00	14.3	6.6	0.00	0.0	0.0	6.7
	0.0						0.0	

Intersection Delay 29.9 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup			L		R		T	R	L	T		
Init Queue			0.0		0.0		0.0	0.0	0.0	0.0		
Flow Rate			335		179		660	606	347	580		
So			1900		1900		1900	1900	1900	1900		
No.Lanes	0	0	0	2	0	2	0	4	2	2	4	0
SL			1770		1584		1862	1584	1770	1862		
LnCapacity			330		295		773	658	367	1268		
Flow Ratio			0.2		0.1		0.4	0.4	0.2	0.3		
v/c Ratio			1.02		0.61		0.85	0.92	0.95	0.46		
Grn Ratio			0.19		0.19		0.42	0.42	0.21	0.68		
I Factor			1.000				1.000		1.000			
AT or PVG			3		3		3	3	3	3		
Pltn Ratio			1.00		1.00		1.00	1.00	1.00	1.00		
PF2			1.00		1.00		1.00	1.00	1.00	1.00		
Q1			8.4		4.1		14.9	14.3	8.6	6.7		
kB			0.4		0.3		0.6	0.5	0.4	0.8		
Q2			4.2		0.5		2.9	3.9	3.0	0.7		
Q Average			12.6		4.6		17.8	18.3	11.5	7.4		
Q Spacing			25.0		25.0		25.0	25.0	25.0	25.0		
Q Storage			0		0		0	0	0	0		
Q S Ratio												
70th Percentile Output:												
fB%			1.2		1.2		1.2	1.2	1.2	1.2		

BOQ		14.7	5.5		20.7	21.2	13.6	8.7			
QSRatio											
85th Percentile Output:											
fB%		1.5	1.6		1.5	1.5	1.5	1.5			
BOQ		18.8	7.2		26.1	26.7	17.4	11.3			
QSRatio											
90th Percentile Output:											
fB%		1.6	1.7		1.6	1.6	1.6	1.7			
BOQ		20.3	7.9		27.9	28.5	18.8	12.4			
QSRatio											
95th Percentile Output:											
fB%		1.8	2.0		1.7	1.7	1.8	1.9			
BOQ		22.6	9.0		30.7	31.3	21.0	14.0			
QSRatio											
98th Percentile Output:											
fB%		2.1	2.4		2.0	1.9	2.1	2.3			
BOQ		26.1	11.0		34.8	35.5	24.4	16.7			
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				1027	246	1126		1474	352	228	1813	624
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
WB Left		A			SB Left	A		
Thru		A			Thru	A	A	A
Right		A			Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green		20.5	0.0			5.5	5.4	6.9	0.0
Yellow		4.0				3.2	4.3	4.3	
All Red		1.5				0.8	1.8	1.8	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								

Westbound								
L	1174	3437	0.92	0.34	30.7	C		
T	637	1863	0.41	0.34	15.5	B	15.7	B
R	1583	1583	0.75	1.00	2.0	A		
Northbound								
T	2075	6765	0.75	0.31	20.3	C	21.4	C
R	485	1583	0.76	0.31	26.0	C		
Southbound								
L	315	3437	0.76	0.09	37.1	D		
T	3146	6765	0.61	0.47	12.3	B	18.1	B
R	736	1583	0.89	0.47	28.0	C		

Intersection Delay = 18.1 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Macarthur at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1027	246	1126		1474	352	228	1813	624
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				270	65	296		388	93	60	477	164
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L		T	R		T	R	L		T	R
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0	12.0	
RTOR Vol						0			0				0	
Adj Flow				1081	259	1185		1552	371		240	1908	657	
%InSharedLn														
Prop LTs					0.000			0.000			0.000			
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000		
Peds Bikes	0				0			0			0			
Buses				0	0	0		0	0		0	0	0	
%InProtPhase														

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8

EB	Left				NB	Left					
	Thru					Thru		A	A		
	Right					Right		A	A		
	Peds					Peds					
WB	Left		A		SB	Left	A				
	Thru		A			Thru	A	A	A		
	Right		A			Right	A	A	A		
	Peds					Peds					
NB	Right				EB	Right					
SB	Right				WB	Right	A	A	A		
Green		20.5	0.0				5.5	5.4	6.9	0.0	
Yellow		4.0					3.2	4.3	4.3		
All Red		1.5					0.8	1.8	1.8		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1027	246	1126		1474	352	228	1813	624
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				1081	259	1185		1552	371	240	1908	657
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
Lane group				L	T	R		T	R	L	T	R
Adj flow				1081	259	1185		1552	371	240	1908	657
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	1081	3437		0.31	0.34	1174	0.92
Prot								
Perm								
Thru	T	259	1863		0.14	0.34	637	0.41
Right	R	1185	1583	#	0.75	1.00	1583	0.75
Northbound								
Prot								
Perm								
Left								

Prot							
Perm							
Thru	T	1552	6765	0.23	0.31	2075	0.75
Right	R	371	1583	0.23	0.31	485	0.76
Southbound							
Prot							
Perm							
Left	L	240	3437	0.07	0.09	315	0.76
Prot							
Perm							
Thru	T	1908	6765	0.28	0.47	3146	0.61
Right	R	657	1583	0.42	0.47	736	0.89

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.75
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.75

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.92	0.34	19.0	1.000	1174	0.44	11.7	0.0	30.7	C		
T	0.41	0.34	15.1	1.000	637	0.11	0.4	0.0	15.5	B	15.7	B
R	0.75	1.00	0.0	0.950	1583	0.30	2.0	0.0	2.0	A		
Northbound												
T	0.75	0.31	18.7	1.000	2075	0.30	1.5	0.0	20.3	C	21.4	C
R	0.76	0.31	18.8	1.000	485	0.32	7.2	0.0	26.0	C		
Southbound												
L	0.76	0.09	26.6	1.000	315	0.31	10.5	0.0	37.1	D		
T	0.61	0.47	12.0	1.000	3146	0.19	0.3	0.0	12.3	B	18.1	B
R	0.89	0.47	14.7	1.000	736	0.42	13.3	0.0	28.0	C		

Intersection delay = 18.1 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	60.0 sec			
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,

see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				

Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.8	19.0	0.00	0.0	0.0	30.7
T	0.0	0.00	19.8	15.1	0.00	0.0	0.0	15.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.0
Northbound								
	0.0						0.0	
T	0.0	0.00	20.8	18.7	0.00	0.0	0.0	20.3
R	0.0	0.00	20.8	18.8	0.00	0.0	0.0	26.0
Southbound								
L	0.0	0.00	27.3	26.6	0.00	0.0	0.0	37.1
T	0.0	0.00	16.0	12.0	0.00	0.0	0.0	12.3
R	0.0	0.00	16.0	14.7	0.00	0.0	0.0	28.0

Intersection Delay 18.1 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	T	R	T	R	L	T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate				556	259	1185	427	371	123	525	657	
So				1900	1900	1900	1900	1900	1900	1900	1900	
No.Lanes	0	0	0	2	1	1	4	1	2	4	1	
SL				1770	1863	1583	1862	1583	1770	1862	1583	
LnCapacity				604	637	1583	571	485	162	866	736	
Flow Ratio				0.3	0.1	0.7	0.2	0.2	0.1	0.3	0.4	
v/c Ratio				0.92	0.41	0.75	0.75	0.76	0.76	0.61	0.89	
Grn Ratio				0.34	0.34	1.00	0.31	0.31	0.09	0.47	0.47	
I Factor					1.000		1.000			1.000		
AT or PVG				3	3	3	3	3	3	3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Q1				8.9	3.3		6.4	5.6	2.0	6.5	10.0	
kB				0.4	0.4	0.7	0.4	0.4	0.2	0.5	0.5	
Q2				3.1	0.3	2.0	1.1	1.1	0.5	0.8	2.9	
Q Average				12.0	3.6		7.5	6.7	2.5	7.3	12.9	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage				0	0	0	0	0	0	0	0	
Q S Ratio												

70th Percentile Output:

fB%		1.2	1.2		1.2	1.2	1.2	1.2	1.2		
BOQ		14.0	4.3		8.9	7.9	3.0	8.6	15.1		
QSRatio											
85th Percentile Output:											
fB%		1.5	1.6		1.5	1.5	1.6	1.5	1.5		
BOQ		18.0	5.6		11.5	10.3	4.0	11.2	19.3		
QSRatio											
90th Percentile Output:											
fB%		1.6	1.7		1.7	1.7	1.8	1.7	1.6		
BOQ		19.4	6.2		12.5	11.2	4.4	12.2	20.8		
QSRatio											
95th Percentile Output:											
fB%		1.8	2.0		1.9	1.9	2.0	1.9	1.8		
BOQ		21.6	7.1		14.2	12.8	5.1	13.8	23.1		
QSRatio											
98th Percentile Output:											
fB%		2.1	2.5		2.3	2.3	2.5	2.3	2.1		
BOQ		25.1	8.8		16.9	15.3	6.4	16.5	26.7		
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				690	297	615		2655	743	617	1610	463
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
WB Left		A			SB Left	A			
Thru		A			Thru	A	A	A	
Right		A			Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right	A	A	A	
Green		21.0	0.0			22.5	24.6	10.2	0.0
Yellow		4.0				3.2	4.3	4.3	
All Red		1.5				0.8	1.8	1.8	

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								

Westbound								
L	722	3437	1.01	0.21	74.4	E		
T	391	1863	0.80	0.21	48.8	D	41.1	D
R	1583	1583	0.41	1.00	0.2	A		
Northbound								
T	2767	6765	1.01	0.41	49.2	D	68.5	E
R	647	1583	1.21	0.41	137.5	F		
Southbound								
L	773	3437	0.84	0.22	45.2	D		
T	4560	6765	0.37	0.67	7.1	A	16.0	B
R	1067	1583	0.46	0.67	8.0	A		

Intersection Delay = 44.4 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Macarthur at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				690	297	615		2655	743	617	1610	463
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				182	78	162		699	196	162	424	122
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L		T	R		T	R	L		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0	12.0	12.0	12.0
RTOR Vol						0				0			0	
Adj Flow				726	313	647			2795	782	649	1695	487
%InSharedLn													
Prop LTs					0.000				0.000			0.000	
Prop RTs					0.000	1.000			0.000	1.000		0.000	1.000
Peds Bikes	0				0				0			0	
Buses				0	0	0			0	0	0	0	0
%InProtPhase													

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	21.0	0.0				22.5	24.6	10.2	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				690	297	615		2655	743	617	1610	463
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				726	313	647		2795	782	649	1695	487
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
Lane group				L		T	R		T	R	L		T	R
Adj flow				726	313	647		2795	782		649	1695	487	
Prop LTs					0.000			0.000			0.000			
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	726	3437	#	0.21	0.21	722	1.01
Prot								
Perm								
Thru	T	313	1863		0.17	0.21	391	0.80
Right	R	647	1583		0.41	1.00	1583	0.41
Northbound								
Prot								
Perm								

Left							
Prot							
Perm							
Thru	T	2795	6765	0.41	0.41	2767	1.01
Right	R	782	1583	# 0.49	0.41	647	1.21
Southbound							
Prot							
Perm							
Left	L	649	3437	# 0.19	0.22	773	0.84
Prot							
Perm							
Thru	T	1695	6765	0.25	0.67	4560	0.37
Right	R	487	1583	0.31	0.67	1067	0.46

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.89
Total lost time per cycle, L = 15.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.06

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.01	0.21	39.5	1.000	722	0.50	34.9	0.0	74.4	E		
T	0.80	0.21	37.5	1.000	391	0.34	11.3	0.0	48.8	D	41.1	D
R	0.41	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Northbound												
T	1.01	0.41	29.6	1.000	2767	0.50	19.6	0.0	49.2	D	68.5	E
R	1.21	0.41	29.6	1.000	647	0.50	107.9	0.0	137.5	F		
Southbound												
L	0.84	0.22	37.0	1.000	773	0.37	8.2	0.0	45.2	D		
T	0.37	0.67	7.1	1.000	4560	0.11	0.1	0.0	7.1	A	16.0	B
R	0.46	0.67	7.7	1.000	1067	0.11	0.3	0.0	8.0	A		

Intersection delay = 44.4 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	100.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				

Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 100.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	39.5	39.5	0.00	1.0	0.0	74.4
T	0.0	0.00	39.5	37.5	0.00	0.0	0.0	48.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Northbound								
	0.0						0.0	
T	0.0	0.00	29.6	29.6	0.00	7.0	0.0	49.2
R	0.0	0.00	29.6	29.6	0.00	33.8	0.0	137.5
Southbound								
L	0.0	0.00	38.8	37.0	0.00	0.0	0.0	45.2
T	0.0	0.00	16.3	7.1	0.00	0.0	0.0	7.1
R	0.0	0.00	16.3	7.7	0.00	0.0	0.0	8.0

Intersection Delay 44.4 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	T	R	T	R	L	T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate				373	313	647	769	782	334	466	487	
So				1900	1900	1900	1900	1900	1900	1900	1900	
No.Lanes	0	0	0	2	1	1	0 4	1	2	4	1	
SL				1770	1863	1583	1862	1583	1770	1862	1583	
LnCapacity				371	391	1583	761	647	398	1255	1067	
Flow Ratio				0.2	0.2	0.4	0.4	0.5	0.2	0.3	0.3	
v/c Ratio				1.01	0.80	0.41	1.01	1.21	0.84	0.37	0.46	
Grn Ratio				0.21	0.21	1.00	0.41	0.41	0.22	0.67	0.67	
I Factor					1.000		1.000			1.000		
AT or PVG				3	3	3	3	3	3	3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Q1				10.4	8.3		21.4	21.7	8.9	5.6	6.4	
kB				0.4	0.4	1.0	0.6	0.6	0.4	0.8	0.8	
Q2				4.5	1.5	0.7	8.3	19.7	1.8	0.5	0.6	
Q Average				14.8	9.7		29.6	41.4	10.7	6.1	7.0	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage				0	0	0	0	0	0	0	0	
Q S Ratio												

70th Percentile Output:											
fB%		1.2	1.2		1.1	1.1	1.2	1.2	1.2	
BOQ		17.3	11.5		34.0	47.0	12.5	7.3	8.3	
QSRatio										
85th Percentile Output:											
fB%		1.5	1.5		1.4	1.4	1.5	1.5	1.5	
BOQ		22.0	14.7		41.8	57.0	16.1	9.5	10.8	
QSRatio										
90th Percentile Output:											
fB%		1.6	1.6		1.5	1.5	1.6	1.7	1.7	
BOQ		23.6	16.0		44.2	60.1	17.4	10.4	11.8	
QSRatio										
95th Percentile Output:											
fB%		1.8	1.8		1.6	1.6	1.8	1.9	1.9	
BOQ		26.2	18.0		47.9	64.6	19.5	11.8	13.4	
QSRatio										
98th Percentile Output:											
fB%		2.0	2.2		1.8	1.7	2.1	2.3	2.3	
BOQ		30.0	21.1		53.4	72.1	22.8	14.2	16.0	
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 NB Ramps

Inter.: Baker at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
LGConfig	L	T			T	R	L	LTR				
Volume	710	2100			267	183	393	426	610			
Lane Width	12.0	12.0			12.0	12.0	12.0	12.0				
RTOR Vol					0			0				

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	30.5	5.6	13.8	0.0		31.4	0.0	
Yellow	3.2	4.0	4.0			3.5		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Flow (s)	Sat Rate	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound									

L	1048	3437	0.71	0.31	33.2	C		
T	2096	3547	1.05	0.59	56.5	E	50.6	D
Westbound								
T	865	3547	0.32	0.24	31.3	C	32.2	C
R	386	1583	0.50	0.24	33.6	C		
Northbound								
L	556	1770	0.74	0.31	36.1	D		
LTR	1015	3233	1.07	0.31	84.6	F	71.3	E
Southbound								

Intersection Delay = 55.1 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Baker at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 NB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	710	2100			267	183	393	426	610			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	187	553			70	48	103	112	161			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900	1900	1900				
ParkExist												
NumPark												
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
LGConfig	L	T			T	R	L	LTR				
Lane Width	12.0	12.0			12.0	12.0	12.0	12.0				
RTOR Vol					0			0				
Adj Flow	747	2211			281	193	414	1090				
%InSharedLn							0					
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000			0.000	1.000		0.589				
Peds Bikes					0			0			0	
Buses	0	0			0	0	0	0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0	0.0	0.0				
Arriv. Type	3	3			3	3	3	3				
Unit Ext.	3.0	3.0			3.0	3.0	3.0	3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0	2.0	2.0				
Ext of g	2.0	2.0			2.0	2.0	2.0	2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	30.5	5.6	13.8	0.0		31.4	0.0	
Yellow	3.2	4.0	4.0			3.5		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	710	2100			267	183	393	426	610			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	747	2211			281	193	414	448	642			
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
Lane group	L	T			T	R	L	LTR				
Adj flow	747	2211			281	193	414	1090				
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000			0.000	1.000		0.589				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound				Westbound			Northbound			Southbound			
LG	L	T			T	R		L	LTR					
So	1900	1900			1900	1900		1900	1900					
Lanes	2	2	0	0	2	1		1	2	0	0	0	0	
fW	1.000	1.000			1.000	1.000		1.000	1.000					
fHV	0.980	0.980			0.980	0.980		0.980	0.980					
fG	1.000	1.000			1.000	1.000		1.000	1.000					
fP	1.000	1.000			1.000	1.000		1.000	1.000					
fBB	1.000	1.000			1.000	1.000		1.000	1.000					
fA	1.000	1.000			1.000	1.000		1.000	1.000					
fLU	0.971	0.952			0.952	1.000		1.000	0.952					
fRT		1.000			1.000	0.850			0.912					
fLT	0.950	1.000			1.000			0.950	1.000					
Sec.														
fLpb	1.000	1.000			1.000			1.000	1.000					
fRpb		1.000			1.000	1.000			1.000					
S	3437	3547			3547	1583		1770	3233					
Sec.														

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	747	3437		0.22	0.31	1048	0.71
Prot								
Perm								
Thru	T	2211	3547	#	0.62	0.59	2096	1.05
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	281	3547		0.08	0.24	865	0.32
Right	R	193	1583		0.12	0.24	386	0.50
Northbound								

Prot							
Perm							
Left	L	414	1770	0.23	0.31	556	0.74
Prot							
Perm							
Thru	LTR	1090	3233	# 0.34	0.31	1015	1.07
Right							
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.96
Total lost time per cycle, L = 9.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.06

Control Delay and LOS Determination

Appr/ Lane	Ratios		Unf Del	Prog Adj	Lane Grp	Incremental Factor	Del	Res Del	Lane Group		Approach	
Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
L	0.71	0.31	30.9	1.000	1048	0.28	2.3	0.0	33.2	C		
T	1.05	0.59	20.5	1.000	2096	0.50	36.0	0.0	56.5	E	50.6	D
Westbound												
T	0.32	0.24	31.0	1.000	865	0.11	0.2	0.0	31.3	C	32.2	C
R	0.50	0.24	32.5	1.000	386	0.11	1.0	0.0	33.6	C		
Northbound												
L	0.74	0.31	30.7	1.000	556	0.30	5.4	0.0	36.1	D		
LTR	1.07	0.31	34.3	1.000	1015	0.50	50.3	0.0	84.6	F	71.3	E
Southbound												

Intersection delay = 55.1 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	100.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					

Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				

OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 100.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	34.8	30.9	0.00	0.0	0.0	33.2
T	0.0	0.00	20.5	20.5	0.00	28.8	0.0	56.5
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	37.8	31.0	0.00	0.0	0.0	31.3
R	0.0	0.00	37.8	32.5	0.00	0.0	0.0	33.6
Northbound								
L	0.0	0.00	34.3	30.7	0.00	0.0	0.0	36.1
LTR	0.0	0.00	34.3	34.3	0.00	18.8	0.0	84.6
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 55.1 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound			Southbound		
LaneGroup	L	T		T	R	L	LTR				
Init Queue	0.0	0.0		0.0	0.0	0.0	0.0				
Flow Rate	384	1161		147	193	414	572				
So	1900	1900		1900	1900	1900	1900				
No.Lanes	2	2	0	0 2	1	1	2	0	0	0	0
SL	1770	1862		1862	1583	1770	1698				
LnCapacity	539	1100		454	386	556	533				
Flow Ratio	0.2	0.6		0.1	0.1	0.2	0.3				
v/c Ratio	0.71	1.06		0.32	0.50	0.74	1.07				
Grn Ratio	0.31	0.59		0.24	0.24	0.31	0.31				
I Factor		1.000		1.000			1.000				
AT or PVG	3	3		3	3	3	3				
Pltn Ratio	1.00	1.00		1.00	1.00	1.00	1.00				
PF2	1.00	1.00		1.00	1.00	1.00	1.00				
Q1	9.5	32.3		3.4	4.6	10.3	15.9				
kB	0.5	0.8		0.5	0.4	0.5	0.5				
Q2	1.2	15.1		0.2	0.4	1.4	8.9				
Q Average	10.7	47.4		3.6	5.0	11.7	24.8				
Q Spacing	25.0	25.0		25.0	25.0	25.0	25.0				

| | | |

L	325	3437	1.06	0.09	108.8	F		
T	2069	3547	0.34	0.58	9.9	A	42.3	D
Westbound								
T	1569	3547	1.01	0.44	49.1	D	52.1	D
R	700	1583	1.00	0.44	59.1	E		
Northbound								
L	551	1770	0.73	0.31	32.5	C		
LTR	1017	3270	1.01	0.31	60.7	E	52.7	D
Southbound								

Intersection Delay = 50.1 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Baker at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 NB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	329	675			1498	665	382	466	505			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	87	178			394	175	101	123	133			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900	1900	1900				
ParkExist												
NumPark												
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
LGConfig	L	T			T	R	L	LTR				
Lane Width	12.0	12.0			12.0	12.0	12.0	12.0				
RTOR Vol					0			0				
Adj Flow	346	711			1577	700	402	1023				
%InSharedLn							0					
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000			0.000	1.000		0.520				
Peds Bikes					0			0			0	
Buses	0	0			0	0	0	0				
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0	0.0	0.0				
Arriv. Type	3	3			3	3	3	3				
Unit Ext.	3.0	3.0			3.0	3.0	3.0	3.0				
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0	2.0	2.0				
Ext of g	2.0	2.0			2.0	2.0	2.0	2.0				
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	8.5	10.8	24.0	0.0		28.0	0.0	
Yellow	3.2	4.0	4.0			3.5		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	329	675			1498	665	382	466	505			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	346	711			1577	700	402	491	532			
No. Lanes	2	2	0	0	2	1	1	2	0	0	0	0
Lane group	L	T			T	R	L	LTR				
Adj flow	346	711			1577	700	402	1023				
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000			0.000	1.000		0.520				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound				Westbound			Northbound			Southbound			
LG	L	T			T	R		L	LTR					
So	1900	1900			1900	1900		1900	1900					
Lanes	2	2	0	0	2	1		1	2	0	0	0	0	
fW	1.000	1.000			1.000	1.000		1.000	1.000					
fHV	0.980	0.980			0.980	0.980		0.980	0.980					
fG	1.000	1.000			1.000	1.000		1.000	1.000					
fP	1.000	1.000			1.000	1.000		1.000	1.000					
fBB	1.000	1.000			1.000	1.000		1.000	1.000					
fA	1.000	1.000			1.000	1.000		1.000	1.000					
fLU	0.971	0.952			0.952	1.000		1.000	0.952					
fRT		1.000			1.000	0.850			0.922					
fLT	0.950	1.000			1.000			0.950	1.000					
Sec.														
fLpb	1.000	1.000			1.000			1.000	1.000					
fRpb		1.000			1.000	1.000			1.000					
S	3437	3547			3547	1583		1770	3270					
Sec.														

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	346	3437	#	0.10	0.09	325	1.06
Prot								
Perm								
Thru	T	711	3547		0.20	0.58	2069	0.34
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1577	3547	#	0.44	0.44	1569	1.01
Right	R	700	1583		0.44	0.44	700	1.00
Northbound								

Prot							
Perm							
Left	L	402	1770	0.23	0.31	551	0.73
Prot							
Perm							
Thru	LTR	1023	3270	# 0.31	0.31	1017	1.01
Right							
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.86
Total lost time per cycle, L = 13.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.01

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.06	0.09	40.8	1.000	325	0.50	68.1	0.0	108.8	F		
T	0.34	0.58	9.8	1.000	2069	0.11	0.1	0.0	9.9	A	42.3	D
Westbound												
T	1.01	0.44	25.1	1.000	1569	0.50	24.0	0.0	49.1	D	52.1	D
R	1.00	0.44	25.1	1.000	700	0.50	34.0	0.0	59.1	E		
Northbound												
L	0.73	0.31	27.6	1.000	551	0.29	4.9	0.0	32.5	C		
LTR	1.01	0.31	31.0	1.000	1017	0.50	29.7	0.0	60.7	E	52.7	D
Southbound												

Intersection delay = 50.1 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 90.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				

Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	90.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				

Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	90.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	40.8	40.8	0.00	5.2	0.0	108.8
T	0.0	0.00	18.8	9.8	0.00	0.0	0.0	9.9
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	25.1	25.1	0.00	2.0	0.0	49.1
R	0.0	0.00	25.1	25.1	0.00	0.0	0.0	59.1
Northbound								
L	0.0	0.00	31.0	27.6	0.00	0.0	0.0	32.5
LTR	0.0	0.00	31.0	31.0	0.00	1.5	0.0	60.7
	0.0						0.0	
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 50.1 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound			Southbound		
LaneGroup	L	T		T	R	L	LTR				
Init Queue	0.0	0.0		0.0	0.0	0.0	0.0				
Flow Rate	178	373		828	700	402	537				
So	1900	1900		1900	1900	1900	1900				
No.Lanes	2	2	0	0	2	1	1	2	0	0	0	0
SL	1770	1862		1862	1583	1770	1717				
LnCapacity	167	1086		824	700	551	534				
Flow Ratio	0.1	0.2		0.4	0.4	0.2	0.3				
v/c Ratio	1.07	0.34		1.00	1.00	0.73	1.01				
Grn Ratio	0.09	0.58		0.44	0.44	0.31	0.31				
I Factor		1.000		1.000			1.000				
AT or PVG	3	3		3	3	3	3				
Pltn Ratio	1.00	1.00		1.00	1.00	1.00	1.00				
PF2	1.00	1.00		1.00	1.00	1.00	1.00				
Q1	4.4	4.9		20.7	17.5	9.0	13.4				
kB	0.2	0.7		0.6	0.6	0.5	0.5				
Q2	3.1	0.4		8.2	7.0	1.2	5.8				
Q Average	7.5	5.2		28.9	24.5	10.2	19.3				

Q Spacing	25.0	25.0		25.0	25.0	25.0	25.0					
Q Storage	0	0		0	0	0	0					
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2		1.1	1.2	1.2	1.2					
BOQ	8.9	6.2		33.2	28.3	12.0	22.4					
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6		1.4	1.4	1.5	1.5					
BOQ	11.5	8.1		40.9	35.1	15.4	28.1					
QSRatio												
90th Percentile Output:												
fB%	1.7	1.7		1.5	1.5	1.6	1.6					
BOQ	12.6	8.9		43.2	37.2	16.7	29.9					
QSRatio												
95th Percentile Output:												
fB%	1.9	1.9		1.6	1.7	1.8	1.7					
BOQ	14.3	10.2		46.9	40.5	18.7	32.8					
QSRatio												
98th Percentile Output:												
fB%	2.3	2.4		1.8	1.9	2.2	1.9					
BOQ	17.0	12.4		52.3	45.3	22.0	37.1					
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 SB Ramps

Inter.: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
LGConfig		TR	R	L	T						LT	R
Volume		2010	257	100	483					847	144	198
Lane Width		12.0	12.0	12.0	12.0						12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	6.0	37.6	28.3	0.0	34.7	0.0		
Yellow	3.0	4.0	4.0		3.3			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 124.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS

Eastbound

TR	2013	3547	1.05	0.57	62.1	E	56.7	E
R	899	1583	0.30	0.57	14.3	B		
Westbound								
L	85	1770	1.24	0.05	233.1	F		
T	2297	3547	0.22	0.65	9.1	A	47.5	D

Northbound

Southbound

LT	945	3401	1.10	0.28	107.4	F	95.9	F
R	440	1583	0.47	0.28	38.3	D		

Intersection Delay = 66.9 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Baker at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 SB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		2010	257	100	483					847	144	198
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		529	68	26	127					223	38	52
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900	1900	1900						1900	1900
ParkExist												
NumPark												
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
LGConfig		TR	R	L	T						LT	R
Lane Width		12.0	12.0	12.0	12.0						12.0	12.0
RTOR Vol			0									0
Adj Flow		2116	271	105	508						1044	208
%InSharedLn			0									
Prop LTs		0.000			0.000						0.854	
Prop RTs		0.000	1.000		0.000						0.000	1.000
Peds Bikes		0						0			0	
Buses		0	0	0	0						0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0	0.0	0.0						0.0	0.0
Arriv. Type		3	3	3	3						3	3
Unit Ext.		3.0	3.0	3.0	3.0						3.0	3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0	2.0	2.0						2.0	2.0
Ext of g		2.0	2.0	2.0	2.0						2.0	2.0
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left								
Thru		A	A					
Right		A	A					
Peds								
WB Left	A							
Thru	A	A	A					
Right								
Peds								
NB Right								
SB Right								
Green	6.0	37.6	28.3	0.0	34.7	0.0		
Yellow	3.0	4.0	4.0		3.3			
All Red	1.0	1.0	1.0		1.0			

NB Left								
Thru								
Right								
Peds								
SB Left	A							
Thru	A							
Right	A							
Peds								
EB Right								
WB Right								

Cycle Length: 124.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		2010	257	100	483					847	144	198
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		2116	271	105	508					892	152	208
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
Lane group		TR	R	L	T						LT	R
Adj flow		2116	271	105	508						1044	208
Prop LTs		0.000			0.000						0.854	
Prop RTs		0.000	1.000		0.000						0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG	TR		R	L	T					LT		R
So	1900	1900	1900	1900						1900	1900	
Lanes 0	2	1	1	2	0	0	0	0	0	2	1	
fW	1.000	1.000	1.000	1.000						1.000	1.000	
fHV	0.980	0.980	0.980	0.980						0.980	0.980	
fG	1.000	1.000	1.000	1.000						1.000	1.000	
fP	1.000	1.000	1.000	1.000						1.000	1.000	
fBB	1.000	1.000	1.000	1.000						1.000	1.000	
fA	1.000	1.000	1.000	1.000						1.000	1.000	
fLU	0.952	1.000	1.000	0.952						0.952	1.000	
fRT	1.000	0.850		1.000						1.000	0.850	
fLT	1.000		0.950	1.000						0.959		
Sec.												
fLpb	1.000		1.000	1.000						1.000		
fRpb	1.000	1.000		1.000						1.000	1.000	
S	3547	1583	1770	3547						3401	1583	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	TR	2116	3547	# 0.60	0.57	2013	1.05
Right	R	271	1583	0.17	0.57	899	0.30
Westbound							
Prot							
Perm							
Left	L	105	1770	# 0.06	0.05	85	1.24
Prot							
Perm							
Thru	T	508	3547	0.14	0.65	2297	0.22
Right							

Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	1044	3401	#	0.31	0.28	945	1.10
Right	R	208	1583		0.13	0.28	440	0.47

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.96
Total lost time per cycle, L = 13.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.08

Control Delay and LOS Determination

Appr/ Lane	Ratios		Unf Del	Prog Adj	Lane Grp	Incremental Factor	Del	Res Del	Lane Group		Approach	
Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
TR	1.05	0.57	27.0	1.000	2013	0.50	35.1	0.0	62.1	E	56.7	E
R	0.30	0.57	14.1	1.000	899	0.11	0.2	0.0	14.3	B		
Westbound												
L	1.24	0.05	59.4	1.000	85	0.50	173.7	0.0	233.1	F		
T	0.22	0.65	9.0	1.000	2297	0.11	0.0	0.0	9.1	A	47.5	D
Northbound												
Southbound												
LT	1.10	0.28	45.1	1.000	945	0.50	62.3	0.0	107.4	F	95.9	F
R	0.47	0.28	37.5	1.000	440	0.11	0.8	0.0	38.3	D		

Intersection delay = 66.9 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 124.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				

or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 124.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.854
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				

Effective green, g (s)
Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C = 124.9 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
TR	0.0	0.00	27.0	27.0	0.00	25.7	0.0	62.1
R	0.0	0.00	27.0	14.1	0.00	0.0	0.0	14.3
Westbound								
L	0.0	0.00	59.4	59.4	0.00	5.0	0.0	233.1
T	0.0	0.00	22.0	9.0	0.00	0.0	0.0	9.1
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LT	0.0	0.00	45.1	45.1	0.00	24.8	0.0	107.4
R	0.0	0.00	45.1	37.5	0.00	0.0	0.0	38.3

Intersection Delay 66.9 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound			Southbound	
LaneGroup	TR	R	L	T					LT	R
Init Queue	0.0	0.0	0.0	0.0					0.0	0.0
Flow Rate	1111	271	105	266					548	208
So	1900	1900	1900	1900					1900	1900
No.Lanes	2	1	1	2	0	0	0	0	2	1
SL	1862	1583	1770	1862					1786	1583
LnCapacity	1057	899	85	1206					496	440
Flow Ratio	0.6	0.2	0.1	0.1					0.3	0.1
v/c Ratio	1.05	0.30	1.24	0.22					1.10	0.47
Grn Ratio	0.57	0.57	0.05	0.65					0.28	0.28
I Factor	1.000			1.000					1.000	
AT or PVG	3	3	3	3					3	3
Pltn Ratio	1.00	1.00	1.00	1.00					1.00	1.00
PF2	1.00	1.00	1.00	1.00					1.00	1.00
Q1	38.5	4.9	3.6	3.8					19.0	6.0
kB	0.9	0.8	0.2	0.9					0.6	0.5
Q2	14.9	0.3	3.3	0.3					10.2	0.5

Q Average		53.4	5.2	6.9	4.1				29.2	6.5	
Q Spacing		25.0	25.0	25.0	25.0				25.0	25.0	
Q Storage		0	0	0	0				0	0	
Q S Ratio											
70th Percentile Output:											
fB%		1.1	1.2	1.2	1.2				1.1	1.2	
BOQ		60.2	6.2	8.2	4.8				33.5	7.6	
QSRatio											
85th Percentile Output:											
fB%		1.4	1.6	1.5	1.6				1.4	1.5	
BOQ		72.1	8.1	10.6	6.3				41.3	9.9	
QSRatio											
90th Percentile Output:											
fB%		1.4	1.7	1.7	1.7				1.5	1.7	
BOQ		76.2	9.0	11.6	7.0				43.6	10.9	
QSRatio											
95th Percentile Output:											
fB%		1.5	1.9	1.9	2.0				1.6	1.9	
BOQ		81.8	10.2	13.2	8.0				47.3	12.4	
QSRatio											
98th Percentile Output:											
fB%		1.7	2.4	2.3	2.4				1.8	2.3	
BOQ		91.7	12.4	15.8	9.9				52.8	14.9	
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 SB Ramps

Inter.: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
LGConfig		TR	R	L	T						LT	R
Volume		802	543	374	1428					278	384	502
Lane Width		12.0	12.0	12.0	12.0						12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	17.5	6.0	18.4	0.0		24.8	0.0	
Yellow	3.0	4.0	4.0			3.3		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 85.0 secs

Intersection Performance Summary

Appr/	Lane	Adj Sat	Ratios	Lane Group	Approach

Lane Grp	Group Capacity	Flow Rate (s)	v/c	g/C	Delay	LOS	Delay	LOS
Eastbound								
TR	1227	3547	0.69	0.35	25.5	C	46.8	D
R	548	1583	1.04	0.35	78.2	E		
Westbound								
L	364	1770	1.08	0.21	104.8	F		
T	2124	3547	0.71	0.60	13.0	B	32.0	C
Northbound								
Southbound								
LT	1014	3474	0.69	0.29	28.6	C	66.9	E
R	462	1583	1.14	0.29	117.4	F		

Intersection Delay = 46.0 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Baker at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 SB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		802	543	374	1428					278	384	502
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		211	143	98	376					73	101	132
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900	1900	1900						1900	1900
ParkExist												
NumPark												
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
LGConfig		TR	R	L	T						LT	R
Lane Width		12.0	12.0	12.0	12.0						12.0	12.0
RTOR Vol		0									0	
Adj Flow		844	572	394	1503						697	528
%InSharedLn		0										
Prop LTs		0.000			0.000						0.420	
Prop RTs		0.000	1.000		0.000						0.000	1.000
Peds Bikes	0						0			0		
Buses		0	0	0	0						0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0	0.0	0.0						0.0	0.0
Arriv. Type		3	3	3	3						3	3
Unit Ext.		3.0	3.0	3.0	3.0						3.0	3.0
I Factor		1.000			1.000						1.000	

Lost Time	2.0	2.0	2.0	2.0			3.2		2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0					2.0	2.0	
Ped Min g	3.2						3.2		3.2		

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	17.5	6.0	18.4	0.0		24.8	0.0	
Yellow	3.0	4.0	4.0			3.3		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 85.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		802	543	374	1428					278	384	502
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		844	572	394	1503					293	404	528
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
Lane group		TR	R	L	T						LT	R
Adj flow		844	572	394	1503						697	528
Prop LTs		0.000			0.000						0.420	
Prop RTs		0.000	1.000		0.000						0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound	
LG	TR	R	L	T						LT	R
So	1900	1900	1900	1900						1900	1900
Lanes 0	2	1	1	2	0	0	0	0	0	2	1
fW	1.000	1.000	1.000	1.000						1.000	1.000
fHV	0.980	0.980	0.980	0.980						0.980	0.980
fG	1.000	1.000	1.000	1.000						1.000	1.000
fP	1.000	1.000	1.000	1.000						1.000	1.000
fBB	1.000	1.000	1.000	1.000						1.000	1.000
fA	1.000	1.000	1.000	1.000						1.000	1.000
fLU	0.952	1.000	1.000	0.952						0.952	1.000
fRT	1.000	0.850		1.000						1.000	0.850
fLT	1.000		0.950	1.000						0.979	
Sec.											
fLpb	1.000		1.000	1.000						1.000	
fRpb	1.000	1.000		1.000						1.000	1.000
S	3547	1583	1770	3547						3474	1583
Sec.											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	844	3547		0.24	0.35	1227	0.69
Right	R	572	1583	#	0.36	0.35	548	1.04
Westbound								
Prot								
Perm								
Left	L	394	1770	#	0.22	0.21	364	1.08
Prot								

Perm							
Thru	T	1503	3547	0.42	0.60	2124	0.71
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LT	697	3474	0.20	0.29	1014	0.69
Right	R	528	1583	# 0.33	0.29	462	1.14

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.92
Total lost time per cycle, L = 13.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.09

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	0.69	0.35	23.9	1.000	1227	0.26	1.6	0.0	25.5	C	46.8	D
R	1.04	0.35	27.8	1.000	548	0.50	50.4	0.0	78.2	E		
Westbound												
L	1.08	0.21	33.8	1.000	364	0.50	71.0	0.0	104.8	F		
T	0.71	0.60	11.9	1.000	2124	0.27	1.1	0.0	13.0	B	32.0	C
Northbound												
Southbound												
LT	0.69	0.29	26.7	1.000	1014	0.26	2.0	0.0	28.6	C	66.9	E
R	1.14	0.29	30.1	1.000	462	0.50	87.3	0.0	117.4	F		

Intersection delay = 46.0 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	85.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					

gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 85.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.420
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	

Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				

Vpedg
OCCpedg
Effective green, g (s)
Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	85.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
TR	0.0	0.00	27.8	23.9	0.00	0.0	0.0	25.5
R	0.0	0.00	27.8	27.8	0.00	6.0	0.0	78.2
Westbound								
L	0.0	0.00	33.8	33.8	0.00	7.5	0.0	104.8
T	0.0	0.00	17.0	11.9	0.00	0.0	0.0	13.0
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LT	0.0	0.00	30.1	26.7	0.00	0.0	0.0	28.6
R	0.0	0.00	30.1	30.1	0.00	16.5	0.0	117.4

Intersection Delay 46.0 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound			Southbound	
LaneGroup	TR	R	L	T					LT	R
Init Queue	0.0	0.0	0.0	0.0					0.0	0.0
Flow Rate	443	572	394	789					366	528
So	1900	1900	1900	1900					1900	1900
No.Lanes	2	1	1	2	0	0	0	0	2	1
SL	1862	1583	1770	1862					1824	1583
LnCapacity	644	548	364	1115					532	462
Flow Ratio	0.2	0.4	0.2	0.4					0.2	0.3
v/c Ratio	0.69	1.04	1.08	0.71					0.69	1.14
Grn Ratio	0.35	0.35	0.21	0.60					0.29	0.29
I Factor	1.000			1.000					1.000	
AT or PVG	3	3	3	3					3	3
Pltn Ratio	1.00	1.00	1.00	1.00					1.00	1.00
PF2	1.00	1.00	1.00	1.00					1.00	1.00
Q1	9.0	13.5	9.3	13.0					7.7	12.5

kB		0.5	0.5	0.4	0.7				0.5	0.4	
Q2		1.1	7.5	6.5	1.7				1.0	10.8	
Q Average		10.1	21.0	15.8	14.6				8.6	23.3	
Q Spacing		25.0	25.0	25.0	25.0				25.0	25.0	
Q Storage		0	0	0	0				0	0	
Q S Ratio											
70th Percentile Output:											
fB%		1.2	1.2	1.2	1.2				1.2	1.2	
BOQ		11.8	24.3	18.5	17.1				10.2	26.9	
QSRatio											
85th Percentile Output:											
fB%		1.5	1.4	1.5	1.5				1.5	1.4	
BOQ		15.2	30.4	23.3	21.7				13.1	33.5	
QSRatio											
90th Percentile Output:											
fB%		1.6	1.5	1.6	1.6				1.7	1.5	
BOQ		16.5	32.3	25.0	23.3				14.3	35.5	
QSRatio											
95th Percentile Output:											
fB%		1.8	1.7	1.7	1.8				1.9	1.7	
BOQ		18.5	35.4	27.7	25.8				16.1	38.7	
QSRatio											
98th Percentile Output:											
fB%		2.2	1.9	2.0	2.0				2.2	1.9	
BOQ		21.7	39.8	31.6	29.6				19.1	43.5	
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 NB Ramps

Inter.: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
LGConfig	L	T			T	R		LT	R			
Volume	268	1666			215	263	115	769	278			
Lane Width	12.0	12.0			12.0	12.0		12.0	12.0			
RTOR Vol					0			0				

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	15.0	5.8	5.5	0.0		19.5	0.0		

Yellow	3.6	4.0	4.0	3.6	
All Red	1.0	1.0	1.0	1.0	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	408	1770	0.69	0.23	27.8	C		
T	1959	3547	0.90	0.55	18.7	B	20.0-	B
Westbound								
T	889	3547	0.25	0.25	19.6	B	23.9	C
R	397	1583	0.70	0.25	27.4	C		
Northbound								
LT	1057	3524	0.88	0.30	30.4	C	28.3	C
R	475	1583	0.62	0.30	22.0	C		
Southbound								

Intersection Delay = 23.2 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Paularino at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 NB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	268	1666			215	263	115	769	278			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	71	438			57	69	30	202	73			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900		1900	1900			
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
LGConfig	L	T			T	R		LT	R			
Lane Width	12.0	12.0			12.0	12.0		12.0	12.0			
RTOR Vol					0			0				
Adj Flow	282	1754			226	277		930	293			
%InSharedLn												
Prop LTs		0.000			0.000			0.130				
Prop RTs	0.000			0.000	1.000		0.000	1.000				
Peds Bikes				0			0			0		
Buses	0	0			0	0		0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R

Init Unmet	0.0	0.0			0.0	0.0			0.0	0.0					
Arriv. Type	3	3			3	3			3	3					
Unit Ext.	3.0	3.0			3.0	3.0			3.0	3.0					
I Factor		1.000			1.000				1.000						
Lost Time	2.0	2.0			2.0	2.0			2.0	2.0					
Ext of g	2.0	2.0			2.0	2.0			2.0	2.0					
Ped Min g					3.2				3.2				3.2		

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	15.0	5.8	5.5	0.0		19.5	0.0		
Yellow	3.6	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	268	1666			215	263	115	769	278			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	282	1754			226	277	121	809	293			
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
Lane group	L	T			T	R		LT	R			
Adj flow	282	1754			226	277		930	293			
Prop LTs		0.000			0.000			0.130				
Prop RTs		0.000			0.000	1.000		0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound				Westbound			Northbound			Southbound		
LG	L	T			T	R		LT	R				
So	1900	1900			1900	1900		1900	1900				
Lanes	1	2	0	0	2	1	0	2	1	0	0	0	
fW	1.000	1.000			1.000	1.000		1.000	1.000				
fHV	0.980	0.980			0.980	0.980		0.980	0.980				
fG	1.000	1.000			1.000	1.000		1.000	1.000				
fP	1.000	1.000			1.000	1.000		1.000	1.000				
fBB	1.000	1.000			1.000	1.000		1.000	1.000				
fA	1.000	1.000			1.000	1.000		1.000	1.000				
fLU	1.000	0.952			0.952	1.000		0.952	1.000				
fRT		1.000			1.000	0.850		1.000	0.850				
fLT	0.950	1.000			1.000			0.994					
Sec.													
fLpb	1.000	1.000			1.000			1.000					
fRpb		1.000			1.000	1.000		1.000	1.000				
S	1770	3547			3547	1583		3524	1583				
Sec.													

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	282	1770		0.16	0.23	408	0.69
Prot								
Perm								
Thru	T	1754	3547	#	0.49	0.55	1959	0.90
Right								

Westbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	226	3547	0.06	0.25	889	0.25
Right	R	277	1583	0.17	0.25	397	0.70
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LT	930	3524	# 0.26	0.30	1057	0.88
Right	R	293	1583	0.19	0.30	475	0.62
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.76
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.89

Control Delay and LOS Determination

Appr/ Lane	Ratios		Unf Del	Prog Adj	Lane Grp	Incremental Factor	Del	Res Del	Lane Group		Approach	
Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
L	0.69	0.23	22.9	1.000	408	0.26	4.9	0.0	27.8	C		
T	0.90	0.55	12.9	1.000	1959	0.42	5.9	0.0	18.7	B	20.0-	B
Westbound												
T	0.25	0.25	19.5	1.000	889	0.11	0.2	0.0	19.6	B	23.9	C
R	0.70	0.25	22.1	1.000	397	0.26	5.3	0.0	27.4	C		
Northbound												
LT	0.88	0.30	21.6	1.000	1057	0.41	8.7	0.0	30.4	C	28.3	C
R	0.62	0.30	19.5	1.000	475	0.20	2.4	0.0	22.0	C		
Southbound												

Intersection delay = 23.2 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				

PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.130	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				

PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				

Left-turn adjustment, fLpb
Permitted Right Turns
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Conflicting bicycle volume, Vbic (bicycles/h)
Vpedg
OCCpedg
Effective green, g (s)
Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

			EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0	sec				
Adj. LT vol from Vol Adjustment Worksheet, v						
v/c ratio from Capacity Worksheet, X						
Protected phase effective green interval, g (s)						
Opposing queue effective green interval, gq						
Unopposed green interval, gu						
Red time r=(C-g-gq-gu)						
Arrival rate, qa=v/(3600(max[X,1.0]))						
Protected ph. departure rate, Sp=s/3600						
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)						
XPerm						
XProt						
Case						
Queue at beginning of green arrow, Qa						
Queue at beginning of unsaturated green, Qu						
Residual queue, Qr						
Uniform Delay, d1						

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	25.0	22.9	0.00	0.0	0.0	27.8
T	0.0	0.00	14.5	12.9	0.00	0.0	0.0	18.7
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	24.4	19.5	0.00	0.0	0.0	19.6
R	0.0	0.00	24.4	22.1	0.00	0.0	0.0	27.4
Northbound								
	0.0						0.0	
LT	0.0	0.00	22.8	21.6	0.00	0.0	0.0	30.4
R	0.0	0.00	22.8	19.5	0.00	0.0	0.0	22.0
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 23.2 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup	L	T		T	R	LT	R			
Init Queue	0.0	0.0		0.0	0.0	0.0	0.0			
Flow Rate	282	921		118	277	488	293			
So	1900	1900		1900	1900	1900	1900			
No.Lanes	1	2	0	0	2	1	0	2	1	0	0	0
SL	1770	1862		1862	1583	1850	1583			
LnCapacity	408	1028		466	397	555	475			
Flow Ratio	0.2	0.5		0.1	0.2	0.3	0.2			
v/c Ratio	0.69	0.90		0.25	0.70	0.88	0.62			
Grn Ratio	0.23	0.55		0.25	0.25	0.30	0.30			

I Factor	1.000			1.000				1.000							
AT or PVG	3	3		3	3			3	3						
Pltn Ratio	1.00	1.00		1.00	1.00			1.00	1.00						
PF2	1.00	1.00		1.00	1.00			1.00	1.00						
Q1	4.7	14.7		1.7	4.5			8.4	4.5						
kB	0.3	0.6		0.4	0.3			0.4	0.4						
Q2	0.7	3.9		0.1	0.7			2.3	0.6						
Q Average	5.4	18.6		1.8	5.3			10.7	5.1						
Q Spacing	25.0	25.0		25.0	25.0			25.0	25.0						
Q Storage	0	0		0	0			0	0						
Q S Ratio															
70th Percentile Output:															
fB%	1.2	1.2		1.2	1.2			1.2	1.2						
BOQ	6.4	21.6		2.2	6.2			12.5	6.1						
QSRatio															
85th Percentile Output:															
fB%	1.6	1.5		1.6	1.6			1.5	1.6						
BOQ	8.3	27.2		2.9	8.2			16.1	7.9						
QSRatio															
90th Percentile Output:															
fB%	1.7	1.6		1.8	1.7			1.6	1.7						
BOQ	9.2	29.0		3.2	9.0			17.4	8.7						
QSRatio															
95th Percentile Output:															
fB%	1.9	1.7		2.0	1.9			1.8	2.0						
BOQ	10.4	31.9		3.7	10.2			19.5	10.0						
QSRatio															
98th Percentile Output:															
fB%	2.4	1.9		2.6	2.4			2.1	2.4						
BOQ	12.7	36.1		4.7	12.5			22.8	12.1						
QSRatio															

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 NB Ramps

Inter.: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
LGConfig	L	T			T	R		LT	R			
Volume	164	571			1002	633	168	913	219			
Lane Width	12.0	12.0			12.0	12.0		12.0	12.0			
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	8.9	5.0	33.4	0.0		33.5	0.0		

Yellow	3.6	4.0	4.0	3.6	
All Red	1.0	1.0	1.0	1.0	

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	158	1770	1.09	0.09	144.8	F		
T	2018	3547	0.30	0.57	11.3	B	41.1	D
Westbound								
T	1539	3547	0.69	0.43	24.1	C	35.8	D
R	687	1583	0.97	0.43	54.5	D		
Northbound								
LT	1179	3519	0.97	0.34	51.1	D	46.9	D
R	530	1583	0.44	0.34	26.5	C		
Southbound								

Intersection Delay = 40.8 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Paularino at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 NB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	164	571			1002	633	168	913	219			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	43	150			264	167	44	240	58			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900		1900	1900			
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
LGConfig	L	T			T	R		LT	R			
Lane Width	12.0	12.0			12.0	12.0		12.0	12.0			
RTOR Vol					0			0				
Adj Flow	173	601			1055	666		1138	231			
%InSharedLn												
Prop LTs		0.000			0.000			0.156				
Prop RTs		0.000			0.000	1.000		0.000	1.000			
Peds Bikes					0			0			0	
Buses	0	0			0	0		0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R

Init Unmet	0.0	0.0			0.0	0.0			0.0	0.0					
Arriv. Type	3	3			3	3			3	3					
Unit Ext.	3.0	3.0			3.0	3.0			3.0	3.0					
I Factor		1.000			1.000				1.000						
Lost Time	2.0	2.0			2.0	2.0			2.0	2.0					
Ext of g	2.0	2.0			2.0	2.0			2.0	2.0					
Ped Min g					3.2				3.2				3.2		

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left		A			NB Left	A			
Thru		A	A	A	Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	8.9	5.0	33.4	0.0		33.5	0.0		
Yellow	3.6	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	164	571			1002	633	168	913	219			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	173	601			1055	666	177	961	231			
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
Lane group	L	T			T	R		LT	R			
Adj flow	173	601			1055	666		1138	231			
Prop LTs		0.000			0.000			0.156				
Prop RTs		0.000			0.000	1.000		0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound				Westbound			Northbound			Southbound		
LG	L	T			T	R		LT	R				
So	1900	1900			1900	1900		1900	1900				
Lanes	1	2	0	0	2	1	0	2	1	0	0	0	
fW	1.000	1.000			1.000	1.000		1.000	1.000				
fHV	0.980	0.980			0.980	0.980		0.980	0.980				
fG	1.000	1.000			1.000	1.000		1.000	1.000				
fP	1.000	1.000			1.000	1.000		1.000	1.000				
fBB	1.000	1.000			1.000	1.000		1.000	1.000				
fA	1.000	1.000			1.000	1.000		1.000	1.000				
fLU	1.000	0.952			0.952	1.000		0.952	1.000				
fRT		1.000			1.000	0.850		1.000	0.850				
fLT	0.950	1.000			1.000			0.992					
Sec.													
fLpb	1.000	1.000			1.000			1.000					
fRpb		1.000			1.000	1.000		1.000	1.000				
S	1770	3547			3547	1583		3519	1583				
Sec.													

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	173	1770	#	0.10	0.09	158	1.09
Prot								
Perm								
Thru	T	601	3547		0.17	0.57	2018	0.30
Right								

Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1055	3547	0.30	0.43	1539	0.69	
Right	R	666	1583	# 0.42	0.43	687	0.97	
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	1138	3519	# 0.32	0.34	1179	0.97	
Right	R	231	1583	0.15	0.34	530	0.44	
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.84
Total lost time per cycle, L = 14.20 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.98

Control Delay and LOS Determination

Appr/ Lane	Ratios		Unf Del	Prog Adj	Lane Grp	Incremental Factor	Del	Res Del	Lane Group		Approach	
Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
L	1.09	0.09	45.5	1.000	158	0.50	99.3	0.0	144.8	F		
T	0.30	0.57	11.2	1.000	2018	0.11	0.1	0.0	11.3	B	41.1	D
Westbound												
T	0.69	0.43	22.8	1.000	1539	0.25	1.3	0.0	24.1	C	35.8	D
R	0.97	0.43	27.7	1.000	687	0.48	26.8	0.0	54.5	D		
Northbound												
LT	0.97	0.34	32.7	1.000	1179	0.47	18.4	0.0	51.1	D	46.9	D
R	0.44	0.34	25.9	1.000	530	0.11	0.6	0.0	26.5	C		
Southbound												

Intersection delay = 40.8 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input				
	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				

PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.156	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				

PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				

Left-turn adjustment, fLpb
Permitted Right Turns
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Conflicting bicycle volume, Vbic (bicycles/h)
Vpedg
OCCpedg
Effective green, g (s)
Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	100.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	45.5	45.5	0.00	3.8	0.0	144.8
T	0.0	0.00	21.5	11.2	0.00	0.0	0.0	11.3
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	28.3	22.8	0.00	0.0	0.0	24.1
R	0.0	0.00	28.3	27.7	0.00	0.0	0.0	54.5
Northbound								
	0.0						0.0	
LT	0.0	0.00	33.3	32.7	0.00	0.0	0.0	51.1
R	0.0	0.00	33.3	25.9	0.00	0.0	0.0	26.5
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 40.8 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup	L	T		T	R	LT	R			
Init Queue	0.0	0.0		0.0	0.0	0.0	0.0			
Flow Rate	173	315		554	666	597	231			
So	1900	1900		1900	1900	1900	1900			
No.Lanes	1	2	0	0 2	1	0 2	1	0 0	0	
SL	1770	1862		1862	1583	1848	1583			
LnCapacity	158	1059		808	687	619	530			
Flow Ratio	0.1	0.2		0.3	0.4	0.3	0.1			
v/c Ratio	1.09	0.30		0.69	0.97	0.96	0.44			
Grn Ratio	0.09	0.57		0.43	0.43	0.34	0.34			

I Factor	1.000			1.000				1.000							
AT or PVG	3	3		3	3			3	3						
Pltn Ratio	1.00	1.00		1.00	1.00			1.00	1.00						
PF2	1.00	1.00		1.00	1.00			1.00	1.00						
Q1	4.8	4.5		12.4	18.1			16.3	5.0						
kB	0.2	0.8		0.6	0.6			0.6	0.5						
Q2	3.4	0.3		1.4	5.8			5.2	0.4						
Q Average	8.2	4.9		13.8	23.9			21.5	5.4						
Q Spacing	25.0	25.0		25.0	25.0			25.0	25.0						
Q Storage	0	0		0	0			0	0						
Q S Ratio															
70th Percentile Output:															
fB%	1.2	1.2		1.2	1.2			1.2	1.2						
BOQ	9.7	5.8		16.1	27.6			24.9	6.4						
QSRatio															
85th Percentile Output:															
fB%	1.5	1.6		1.5	1.4			1.4	1.6						
BOQ	12.6	7.6		20.5	34.3			31.1	8.3						
QSRatio															
90th Percentile Output:															
fB%	1.7	1.7		1.6	1.5			1.5	1.7						
BOQ	13.7	8.3		22.0	36.3			33.0	9.2						
QSRatio															
95th Percentile Output:															
fB%	1.9	2.0		1.8	1.7			1.7	1.9						
BOQ	15.4	9.5		24.5	39.6			36.1	10.5						
QSRatio															
98th Percentile Output:															
fB%	2.2	2.4		2.0	1.9			1.9	2.4						
BOQ	18.3	11.6		28.2	44.4			40.6	12.7						
QSRatio															

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 SB Ramps

Inter.: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
LGConfig		TR		L	T						LT	R
Volume		1143	175	108	214					787	967	196
Lane Width		12.0		12.0	12.0						12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	6.2	6.4	35.6	0.0		63.0	0.0	

Yellow	3.2	4.0	4.0	3.6
All Red	1.0	1.0	1.0	1.0

Cycle Length: 130.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
TR	1257	3476	1.10	0.36	100.2	F	100.2	F
Westbound								
L	84	1770	1.36	0.05	282.1	F		
T	1566	3547	0.14	0.44	21.7	C	109.2	F
Northbound								
Southbound								
LT	1681	3469	1.10	0.48	87.5	F	80.7	F
R	767	1583	0.27	0.48	20.0+	C		

Intersection Delay = 90.4 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Paularino at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 SB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1143	175	108	214					787	967	196
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		301	46	28	56					207	254	52
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900		1900	1900						1900	1900
ParkExist												
NumPark												
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
LGConfig		TR		L	T						LT	R
Lane Width		12.0		12.0	12.0						12.0	12.0
RTOR Vol			0									0
Adj Flow		1387		114	225						1846	206
%InSharedLn												
Prop LTs		0.000			0.000						0.449	
Prop RTs		0.133			0.000						0.000	1.000
Peds Bikes		0						0			0	
Buses		0		0	0						0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R

Init Unmet	0.0		0.0	0.0				0.0	0.0		
Arriv. Type	3		3	3				3	3		
Unit Ext.	3.0		3.0	3.0				3.0	3.0		
I Factor	1.000			1.000				1.000			
Lost Time	2.0		2.0	2.0				2.0	2.0		
Ext of g	2.0		2.0	2.0				2.0	2.0		
Ped Min g	3.2					3.2		3.2			

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
WB Left	A				SB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	6.2	6.4	35.6	0.0		63.0	0.0		
Yellow	3.2	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 130.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1143	175	108	214					787	967	196
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		1203	184	114	225					828	1018	206
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
Lane group		TR		L	T						LT	R
Adj flow		1387		114	225						1846	206
Prop LTs		0.000			0.000						0.449	
Prop RTs		0.133			0.000						0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound		Westbound			Northbound			Southbound	
LG	TR		L	T					LT	R
So	1900		1900	1900					1900	1900
Lanes	2	0	1	2	0	0	0	0	2	1
fW	1.000		1.000	1.000					1.000	1.000
fHV	0.980		0.980	0.980					0.980	0.980
fG	1.000		1.000	1.000					1.000	1.000
fP	1.000		1.000	1.000					1.000	1.000
fBB	1.000		1.000	1.000					1.000	1.000
fA	1.000		1.000	1.000					1.000	1.000
fLU	0.952		1.000	0.952					0.952	1.000
fRT	0.980			1.000					1.000	0.850
fLT	1.000		0.950	1.000					0.978	
Sec.										
fLpb	1.000		1.000	1.000					1.000	
fRpb	1.000			1.000					1.000	1.000
S	3476		1770	3547					3469	1583
Sec.										

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	TR	1387	3476	# 0.40	0.36	1257	1.10
Right							

Westbound								
Prot								
Perm								
Left	L	114	1770	#	0.06	0.05	84	1.36
Prot								
Perm								
Thru	T	225	3547		0.06	0.44	1566	0.14
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	1846	3469	#	0.53	0.48	1681	1.10
Right	R	206	1583		0.13	0.48	767	0.27

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.00
Total lost time per cycle, L = 13.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.11

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	1.10	0.36	41.5	1.000	1257	0.50	58.7	0.0	100.2	F	100.2	F
Westbound												
L	1.36	0.05	61.9	1.000	84	0.50	220.2	0.0	282.1	F		
T	0.14	0.44	21.6	1.000	1566	0.11	0.0	0.0	21.7	C	109.2	F
Northbound												
Southbound												
LT	1.10	0.48	33.5	1.000	1681	0.50	54.0	0.0	87.5	F	80.7	F
R	0.27	0.48	19.8	1.000	767	0.11	0.2	0.0	20.0+	C		

Intersection delay = 90.4 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input				
	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	130.0 sec			
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				

PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	130.0 sec			
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.449
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				

PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				

ApbT
Proportion of left turns, PLT

Proportion of left turns using protected phase, PLTA
Left-turn adjustment, fLpb
Permitted Right Turns
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Conflicting bicycle volume, Vbic (bicycles/h)
Vpedg
OCCpedg
Effective green, g (s)
Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C = 130.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
TR	0.0	0.00	41.5	41.5	0.00	32.5	0.0	100.2
	0.0						0.0	
Westbound								
L	0.0	0.00	61.9	61.9	0.00	7.5	0.0	282.1
T	0.0	0.00	36.3	21.6	0.00	0.0	0.0	21.7
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LT	0.0	0.00	33.5	33.5	0.00	41.3	0.0	87.5
R	0.0	0.00	33.5	19.8	0.00	0.0	0.0	20.0+

Intersection Delay 90.4 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

LaneGroup	Eastbound	Westbound		Northbound			Southbound	
	TR	L	T				LT	R
Init Queue	0.0	0.0	0.0				0.0	0.0
Flow Rate	728	114	118				969	206
So	1900	1900	1900				1900	1900
No.Lanes	0 2 0	1	2 0	0	0	0	0 2	1
SL	1825	1770	1862				1821	1583
LnCapacity	660	84	822				882	767
Flow Ratio	0.4	0.1	0.1				0.5	0.1
v/c Ratio	1.10	1.36	0.14				1.10	0.27

Grn Ratio	0.36	0.05	0.44				0.48	0.48
I Factor	1.000		1.000				1.000	
AT or PVG	3	3	3				3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00
PF2	1.00	1.00	1.00				1.00	1.00
Q1	26.3	4.1	2.5				35.0	4.4
kB	0.7	0.2	0.8				0.8	0.7
Q2	13.1	4.4	0.1				16.7	0.3
Q Average	39.4	8.5	2.7				51.7	4.7
Q Spacing	25.0	25.0	25.0				25.0	25.0
Q Storage	0	0	0				0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.1	1.2	1.2				1.1	1.2
BOQ	44.8	10.0	3.2				58.3	5.6
QSRatio								
85th Percentile Output:								
fB%	1.4	1.5	1.6				1.4	1.6
BOQ	54.4	13.0	4.2				69.9	7.3
QSRatio								
90th Percentile Output:								
fB%	1.5	1.7	1.8				1.4	1.7
BOQ	57.4	14.1	4.7				73.9	8.0
QSRatio								
95th Percentile Output:								
fB%	1.6	1.9	2.0				1.5	2.0
BOQ	61.8	15.9	5.4				79.3	9.2
QSRatio								
98th Percentile Output:								
fB%	1.7	2.2	2.5				1.7	2.4
BOQ	68.9	18.9	6.7				88.8	11.2
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 SB Ramps

Inter.: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
LGConfig		TR		L	T						LT	R
Volume		519	107	302	869					171	711	301
Lane Width		12.0		12.0	12.0						12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		

	Peds					Peds		
NB	Right				EB	Right		
SB	Right				WB	Right		
Green		17.8	5.2	5.0	0.0		18.1	0.0
Yellow		3.2	4.0	4.0			3.6	
All Red		1.0	1.0	1.0			1.0	

Cycle Length: 64.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	809	3455	0.81	0.23	30.0	C	30.0	C
Westbound								
L	485	1770	0.66	0.27	24.0	C		
T	2033	3547	0.45	0.57	8.1	A	12.2	B
Northbound								
Southbound								
LT	980	3513	0.95	0.28	40.3	D	36.9	D
R	441	1583	0.72	0.28	26.7	C		

Intersection Delay = 25.7 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Paularino at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 SB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		519	107	302	869					171	711	301
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		137	28	79	229					45	187	79
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900		1900	1900						1900	1900
ParkExist												
NumPark												
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
LGConfig		TR		L	T						LT	R
Lane Width		12.0		12.0	12.0						12.0	12.0
RTOR Vol			0									0
Adj Flow		659		318	915						928	317
%InSharedLn												
Prop LTs		0.000			0.000						0.194	
Prop RTs		0.171			0.000						0.000	1.000
Peds Bikes		0						0			0	
Buses		0		0	0						0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0						0.0	0.0
Arriv. Type		3		3	3						3	3
Unit Ext.		3.0		3.0	3.0						3.0	3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0		2.0	2.0						2.0	2.0
Ext of g		2.0		2.0	2.0						2.0	2.0
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left								
Thru		A	A					
Right		A	A					
Peds								
WB Left	A							
Thru	A	A	A					
Right								
Peds								
NB Left								
Thru								
Right								
Peds								
SB Left	A							
Thru	A							
Right	A							
Peds								
NB Right								
SB Right								
EB Right								
WB Right								
Green	17.8	5.2	5.0	0.0	18.1	0.0		
Yellow	3.2	4.0	4.0		3.6			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 64.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		519	107	302	869					171	711	301
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		546	113	318	915					180	748	317
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
Lane group		TR		L	T						LT	R
Adj flow		659		318	915						928	317
Prop LTs		0.000			0.000						0.194	
Prop RTs		0.171			0.000						0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound		Westbound			Northbound			Southbound	
LG	TR		L	T					LT	R
So	1900		1900	1900					1900	1900
Lanes	2	0	1	2	0	0	0	0	2	1
fW	1.000		1.000	1.000					1.000	1.000
fHV	0.980		0.980	0.980					0.980	0.980
fG	1.000		1.000	1.000					1.000	1.000
fP	1.000		1.000	1.000					1.000	1.000
fBB	1.000		1.000	1.000					1.000	1.000
fA	1.000		1.000	1.000					1.000	1.000
fLU	0.952		1.000	0.952					0.952	1.000
fRT	0.974			1.000					1.000	0.850
fLT	1.000		0.950	1.000					0.990	
Sec.										
fLpb	1.000		1.000	1.000					1.000	
fRpb	1.000			1.000					1.000	1.000
S	3455		1770	3547					3513	1583
Sec.										

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							

Prot								
Perm								
Thru	TR	659	3455	#	0.19	0.23	809	0.81
Right								
Westbound								
Prot								
Perm								
Left	L	318	1770	#	0.18	0.27	485	0.66
Prot								
Perm								
Thru	T	915	3547		0.26	0.57	2033	0.45
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	928	3513	#	0.26	0.28	980	0.95
Right	R	317	1583		0.20	0.28	441	0.72

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.63
Total lost time per cycle, L = 13.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.81

Control Delay and LOS Determination

Appr/ Lane	Ratios		Unf Del	Prog Adj	Lane Grp	Incremental Factor	Del	Res Del	Lane Group		Approach	
Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
TR	0.81	0.23	23.5	1.000	809	0.36	6.4	0.0	30.0	C	30.0	C
Westbound												
L	0.66	0.27	20.8	1.000	485	0.23	3.2	0.0	24.0	C		
T	0.45	0.57	8.0	1.000	2033	0.11	0.2	0.0	8.1	A	12.2	B
Northbound												
Southbound												
LT	0.95	0.28	22.9	1.000	980	0.46	17.4	0.0	40.3	D	36.9	D
R	0.72	0.28	21.1	1.000	441	0.28	5.6	0.0	26.7	C		

Intersection delay = 25.7 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 64.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				

Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 64.9 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.194
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	

Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				

Number of turning lanes, Nturn
ApbT
Proportion of left turns, PLT
Proportion of left turns using protected phase, PLTA
Left-turn adjustment, fLpb
Permitted Right Turns
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Conflicting bicycle volume, Vbic (bicycles/h)
Vpedg
OCCpedg
Effective green, g (s)
Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	64.9 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
TR	0.0	0.00	24.9	23.5	0.00	0.0	0.0	30.0
	0.0						0.0	
Westbound								
L	0.0	0.00	23.6	20.8	0.00	0.0	0.0	24.0
T	0.0	0.00	13.9	8.0	0.00	0.0	0.0	8.1
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LT	0.0	0.00	23.4	22.9	0.00	0.0	0.0	40.3
R	0.0	0.00	23.4	21.1	0.00	0.0	0.0	26.7

Intersection Delay 25.7 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

LaneGroup	Eastbound	Westbound	Northbound	Southbound
Init Queue	0.0	0.0 0.0		0.0 0.0
Flow Rate	346	318 480		487 317
So	1900	1900 1900		1900 1900
No.Lanes	0 2 0	1 2 0	0 0 0	0 2 1
SL	1814	1770 1862		1845 1583

LnCapacity		424		485	1067					514	441				
Flow Ratio		0.2		0.2	0.3					0.3	0.2				
v/c Ratio		0.82		0.66	0.45					0.95	0.72				
Grn Ratio		0.23		0.27	0.57					0.28	0.28				
I Factor		1.000			1.000					1.000					
AT or PVG		3		3	3					3	3				
Pltn Ratio		1.00		1.00	1.00					1.00	1.00				
PF2		1.00		1.00	1.00					1.00	1.00				
Q1		5.9		5.1	5.0					8.6	5.2				
kB		0.3		0.4	0.6					0.4	0.3				
Q2		1.3		0.7	0.5					3.4	0.8				
Q Average		7.2		5.8	5.5					12.0	6.0				
Q Spacing		25.0		25.0	25.0					25.0	25.0				
Q Storage		0		0	0					0	0				
Q S Ratio															
70th Percentile Output:															
fB%		1.2		1.2	1.2					1.2	1.2				
BOQ		8.6		6.8	6.5					14.1	7.1				
QSRatio															
85th Percentile Output:															
fB%		1.5		1.5	1.6					1.5	1.5				
BOQ		11.1		8.9	8.5					18.0	9.3				
QSRatio															
90th Percentile Output:															
fB%		1.7		1.7	1.7					1.6	1.7				
BOQ		12.1		9.8	9.3					19.5	10.2				
QSRatio															
95th Percentile Output:															
fB%		1.9		1.9	1.9					1.8	1.9				
BOQ		13.7		11.1	10.6					21.7	11.6				
QSRatio															
98th Percentile Output:															
fB%		2.3		2.3	2.4					2.1	2.3				
BOQ		16.4		13.5	12.9					25.2	14.0				
QSRatio															

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 NB Ramps

Inter.: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Volume		1748	640		616	300	1074		772			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru		A			Thru				
Right		A	A		Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				

	Peds					Peds		
NB	Right	A	A		EB	Right	A	
SB	Right				WB	Right	A	
Green		64.6	5.2	0.0			39.6	0.0
Yellow		4.5	4.5				3.6	
All Red		1.0	1.0				1.0	

Cycle Length: 125.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1833	3547	1.00	0.52	52.1	D	38.2	D
R	1583	1583	0.43	1.00	0.2	A		
Westbound								
T	3057	5074	0.21	0.60	11.4	B	7.7	A
R	1583	1583	0.20	1.00	0.1	A		
Northbound								
L	1089	3437	1.04	0.32	80.5	F		
							47.0	D
R	1583	1583	0.51	1.00	0.3	A		
Southbound								

Intersection Delay = 35.9 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Macarthur at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1748	640		616	300	1074		772			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		460	168		162	79	283		203			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900		1900			
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			
Adj Flow		1840	674		648	316	1131		813			
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			
Peds Bikes		0			0		0				0	
Buses		0	0		0	0	0		0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0		0.0			
Arriv. Type		3	3		3	3	3		3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0		3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0		2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0		2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru		A			Thru			
Right		A	A		Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right		A	A		EB Right	A		
SB Right					WB Right	A		
Green		64.6	5.2	0.0		39.6	0.0	
Yellow		4.5	4.5			3.6		
All Red		1.0	1.0			1.0		

Cycle Length: 125.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1748	640		616	300	1074		772			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		1840	674		648	316	1131		813			
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
Lane group		T	R		T	R	L		R			
Adj flow		1840	674		648	316	1131		813			
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG		T	R		T	R	L		R			
So		1900	1900		1900	1900	1900		1900			
Lanes	0	2	1	0	3	1	2	0	1	0	0	0
fW		1.000	1.000		1.000	1.000	1.000		1.000			
fHV		0.980	0.980		0.980	0.980	0.980		0.980			
fG		1.000	1.000		1.000	1.000	1.000		1.000			
fP		1.000	1.000		1.000	1.000	1.000		1.000			
fBB		1.000	1.000		1.000	1.000	1.000		1.000			
fA		1.000	1.000		1.000	1.000	1.000		1.000			
fLU		0.952	1.000		0.908	1.000	0.971		1.000			
fRT		1.000	0.850		1.000	0.850			0.850			
fLT		1.000			1.000		0.950					
Sec.												
fLpb		1.000			1.000		1.000					
fRpb		1.000	1.000		1.000	1.000			1.000			
S		3547	1583		5074	1583	3437		1583			
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							

Prot								
Perm								
Thru	T	1840	3547	0.52	0.52	1833	1.00	
Right	R	674	1583	0.43	1.00	1583	0.43	
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	648	5074	0.13	0.60	3057	0.21	
Right	R	316	1583	0.20	1.00	1583	0.20	
Northbound								
Prot								
Perm								
Left	L	1131	3437	0.33	0.32	1089	1.04	
Prot								
Perm								
Thru								
Right	R	813	1583	# 0.51	1.00	1583	0.51	
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.51
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.51

Control Delay and LOS Determination

Appr/ Lane	Ratios		Unf Del	Prog Adj	Lane Grp	Incremental Factor	Del	Res Del	Lane Group		Approach	
Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
T	1.00	0.52	30.2	1.000	1833	0.50	21.9	0.0	52.1	D	38.2	D
R	0.43	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Westbound												
T	0.21	0.60	11.3	1.000	3057	0.11	0.0	0.0	11.4	B	7.7	A
R	0.20	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Northbound												
L	1.04	0.32	42.7	1.000	1089	0.50	37.8	0.0	80.5	F		
											47.0	D
R	0.51	1.00	0.0	0.950	1583	0.12	0.3	0.0	0.3	A		
Southbound												

Intersection delay = 35.9 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				

Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				

Number of turning lanes, Nturn

ApbT
Proportion of left turns, PLT
Proportion of left turns using protected phase, PLTA
Left-turn adjustment, fLpb
Permitted Right Turns
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Conflicting bicycle volume, Vbic (bicycles/h)
Vpedg
OCCpedg
Effective green, g (s)
Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 125.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
T	0.0	0.00	30.2	30.2	0.00	1.7	0.0	52.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
	0.0						0.0	
T	0.0	0.00	24.8	11.3	0.00	0.0	0.0	11.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Northbound								
L	0.0	0.00	42.7	42.7	0.00	10.5	0.0	80.5
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.3
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 35.9 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	T	R	T	R	L	R		
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0		
Flow Rate	966	674	237	316	582	813		
So	1900	1900	1900	1900	1900	1900		
No.Lanes	2	1	3	1	2	1	0	0

SL	1862	1583		1862	1583		1770		1583						
LnCapacity	962	1583		1122	1583		560		1583						
Flow Ratio	0.5	0.4		0.1	0.2		0.3		0.5						
v/c Ratio	1.00	0.43		0.21	0.20		1.04		0.51						
Grn Ratio	0.52	1.00		0.60	1.00		0.32		1.00						
I Factor	1.000			1.000			1.000								
AT or PVG	3	3		3	3		3		3						
Pltn Ratio	1.00	1.00		1.00	1.00		1.00		1.00						
PF2	1.00			1.00			1.00								
Q1	33.5			3.7			20.2								
kB	0.8	1.1		0.9	1.1		0.6		1.1						
Q2	10.2	0.8		0.2	0.3		8.1		1.2						
Q Average	43.8			4.0			28.3								
Q Spacing	25.0	25.0		25.0	25.0		25.0		25.0						
Q Storage	0	0		0	0		0		0						
Q S Ratio															
70th Percentile Output:															
fB%	1.1			1.2			1.1								
BOQ	49.6			4.7			32.5								
QSRatio															
85th Percentile Output:															
fB%	1.4			1.6			1.4								
BOQ	59.9			6.2			40.1								
QSRatio															
90th Percentile Output:															
fB%	1.4			1.7			1.5								
BOQ	63.2			6.9			42.4								
QSRatio															
95th Percentile Output:															
fB%	1.6			2.0			1.6								
BOQ	67.9			7.9			46.0								
QSRatio															
98th Percentile Output:															
fB%	1.7			2.4			1.8								
BOQ	75.9			9.7			51.3								
QSRatio															

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 NB Ramps

Inter.: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Volume		806	810		1866	1290	754		234			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru		A	A		Thru				
Right		A	A		Right	A			

	Peds					Peds			
WB	Left				SB	Left			
	Thru	A	A			Thru			
	Right	A	A			Right			
	Peds					Peds			
NB	Right	A	A		EB	Right	A		
SB	Right				WB	Right	A		
Green		23.2	7.0	0.0			17.2	0.0	
Yellow		1.5	4.5				3.6		
All Red		1.0	1.0				1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1933	3547	0.44	0.55	8.3	A	4.3	A
R	1583	1583	0.54	1.00	0.4	A		
Westbound								
T	2765	5074	0.71	0.55	11.0	B	8.5	A
R	1583	1583	0.86	1.00	5.0	A		
Northbound								
L	985	3437	0.81	0.29	24.9	C		
							19.0	B
R	1583	1583	0.16	1.00	0.0+	A		
Southbound								

Intersection Delay = 9.1 (sec/veh) Intersection LOS = A

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Macarthur at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		806	810		1866	1290	754		234			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		212	213		491	339	198		62			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900		1900			
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			
Adj Flow		848	853		1964	1358	794		246			
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			
Peds Bikes		0			0			0			0	

Buses	0	0	0	0	0		0				
%InProtPhase											

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0		0.0			
Arriv. Type		3	3		3	3	3		3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0		3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0		2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0		2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru		A	A		Thru				
Right		A	A		Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right		A	A		EB Right	A			
SB Right					WB Right	A			
Green		23.2	7.0	0.0		17.2	0.0		
Yellow		1.5	4.5			3.6			
All Red		1.0	1.0			1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		806	810		1866	1290	754		234			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		848	853		1964	1358	794		246			
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
Lane group		T	R		T	R	L		R			
Adj flow		848	853		1964	1358	794		246			
Prop LTs		0.000			0.000							
Prop RTs	0.000	1.000		0.000	1.000			1.000				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R		L		R			
So	1900	1900		1900	1900		1900		1900			
Lanes	0 2	1	0	3	1	0	2	0	1	0	0	0
fW	1.000	1.000		1.000	1.000		1.000		1.000			
fHV	0.980	0.980		0.980	0.980		0.980		0.980			
fG	1.000	1.000		1.000	1.000		1.000		1.000			
fP	1.000	1.000		1.000	1.000		1.000		1.000			
fBB	1.000	1.000		1.000	1.000		1.000		1.000			
fA	1.000	1.000		1.000	1.000		1.000		1.000			
fLU	0.952	1.000		0.908	1.000		0.971		1.000			
fRT	1.000	0.850		1.000	0.850				0.850			
fLT	1.000			1.000			0.950					
Sec.												
fLpb	1.000			1.000			1.000					
fRpb	1.000	1.000		1.000	1.000				1.000			
S	3547	1583		5074	1583		3437		1583			
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio

Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	848	3547	0.24	0.55	1933	0.44
Right	R	853	1583	0.54	1.00	1583	0.54
Westbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1964	5074	0.39	0.55	2765	0.71
Right	R	1358	1583	# 0.86	1.00	1583	0.86
Northbound							
Prot							
Perm							
Left	L	794	3437	0.23	0.29	985	0.81
Prot							
Perm							
Thru							
Right	R	246	1583	0.16	1.00	1583	0.16
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.86
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.86

Control Delay and LOS Determination

Appr/ Lane	Ratios		Unf Del	Prog Adj	Lane Grp	Incremental Factor	Del	Res Del	Lane Group		Approach	
Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
T	0.44	0.55	8.2	1.000	1933	0.11	0.2	0.0	8.3	A	4.3	A
R	0.54	1.00	0.0	0.950	1583	0.14	0.4	0.0	0.4	A		
Westbound												
T	0.71	0.55	10.1	1.000	2765	0.27	0.9	0.0	11.0	B	8.5	A
R	0.86	1.00	0.0	0.950	1583	0.39	5.0	0.0	5.0	A		
Northbound												
L	0.81	0.29	19.9	1.000	985	0.35	5.0	0.0	24.9	C		
											19.0	B
R	0.16	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Southbound												

Intersection delay = 9.1 (sec/veh) Intersection LOS = A

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	60.0 sec			
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				

Opposing lane util. factor, fLUo 0.908 0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts
Input
EB WB NB SB
Opposed by Single(S) or Multiple(M) lane approach
Cycle length, C 60.0 sec
Total actual green time for LT lane group, G (s)
Effective permitted green time for LT lane group, g(s)
Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT 0.000 0.000
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 0.908 0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns
EB WB NB SB
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Pedestrian flow rate, Vpedg (p/h)
OCCpedg
Opposing queue clearing green, gq (s)
Eff. ped. green consumed by opp. veh. queue, gq/gp

OCCpedu
Opposing flow rate, Vo (veh/h)
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion of left turns, PLT
Proportion of left turns using protected phase, PLTA
Left-turn adjustment, fLpb
Permitted Right Turns
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Conflicting bicycle volume, Vbic (bicycles/h)
Vpedg
OCCpedg
Effective green, g (s)
Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
T	0.0	0.00	13.6	8.2	0.00	0.0	0.0	8.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.4
Westbound								
	0.0						0.0	
T	0.0	0.00	13.6	10.1	0.00	0.0	0.0	11.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	5.0
Northbound								
L	0.0	0.00	21.4	19.9	0.00	0.0	0.0	24.9
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 9.1 sec/veh Intersection LOS A

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound
LaneGroup	T	R	T	R	L	R	
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	

Flow Rate		445	853		720	1358		408		246					
So		1900	1900		1900	1900		1900		1900					
No.Lanes	0	2	1	0	3	1		2	0	1		0	0	0	
SL		1862	1583		1862	1583		1770		1583					
LnCapacity		1015	1583		1015	1583		507		1583					
Flow Ratio		0.2	0.5		0.4	0.9		0.2		0.2					
v/c Ratio		0.44	0.54		0.71	0.86		0.80		0.16					
Grn Ratio		0.55	1.00		0.55	1.00		0.29		1.00					
I Factor		1.000			1.000				1.000						
AT or PVG		3	3		3	3		3		3					
Pltn Ratio		1.00	1.00		1.00	1.00		1.00		1.00					
PF2		1.00			1.00			1.00							
Q1		4.4			8.9			6.3							
kB		0.5	0.7		0.5	0.7		0.4		0.7					
Q2		0.4	0.8		1.3	3.8		1.3		0.1					
Q Average		4.9			10.2			7.6							
Q Spacing		25.0	25.0		25.0	25.0		25.0		25.0					
Q Storage		0	0		0	0		0		0					
Q S Ratio															
70th Percentile Output:															
fB%		1.2			1.2			1.2							
BOQ		5.8			12.0			9.0							
QSRatio															
85th Percentile Output:															
fB%		1.6			1.5			1.5							
BOQ		7.6			15.4			11.7							
QSRatio															
90th Percentile Output:															
fB%		1.7			1.6			1.7							
BOQ		8.3			16.7			12.8							
QSRatio															
95th Percentile Output:															
fB%		2.0			1.8			1.9							
BOQ		9.5			18.8			14.5							
QSRatio															
98th Percentile Output:															
fB%		2.4			2.2			2.3							
BOQ		11.6			22.0			17.2							
QSRatio															

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 SB Ramps

Inter.: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Volume		1442	760		1260	190				1148		1030
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			

	Peds					Peds		
WB	Left				SB	Left	A	
	Thru	A	A			Thru		
	Right	A	A			Right	A	
	Peds					Peds		
NB	Right				EB	Right	A	
SB	Right				WB	Right	A	
Green		15.3	7.6	0.0			26.6	0.0
Yellow		4.0	4.0				3.5	
All Red		1.5	1.5				1.0	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1550	3547	0.98	0.44	36.1	D	23.7	C
R	1583	1583	0.51	1.00	0.3	A		
Westbound								
T	2217	5074	0.60	0.44	14.4	B	12.5	B
R	1583	1583	0.13	1.00	0.0+	A		
Northbound								
Southbound								
L	1407	3437	0.86	0.41	23.1	C		
							28.1	C
R	1147	2803	0.95	0.41	33.8	C		

Intersection Delay = 22.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Macarthur at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 SB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1442	760		1260	190				1148		1030
% Heavy Veh		2	2		2	2				2		2
PHF		0.95	0.95		0.95	0.95				0.95		0.95
PK 15 Vol		379	200		332	50				302		271
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900		1900	1900				1900		1900
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0
Adj Flow		1518	800		1326	200				1208		1084
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000
Peds Bikes		0			0			0			0	

Buses	0	0	0	0				0	0		
%InProtPhase											

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0				0.0		0.0
Arriv. Type		3	3		3	3				3		3
Unit Ext.		3.0	3.0		3.0	3.0				3.0		3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0		2.0	2.0				2.0		2.0
Ext of g		2.0	2.0		2.0	2.0				2.0		2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
WB Left					SB Left	A			
Thru		A	A		Thru				
Right		A	A		Right	A			
Peds					Peds				
NB Right					EB Right	A			
SB Right					WB Right	A			
Green		15.3	7.6	0.0		26.6	0.0		
Yellow		4.0	4.0			3.5			
All Red		1.5	1.5			1.0			

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1442	760		1260	190				1148		1030
PHF		0.95	0.95		0.95	0.95				0.95		0.95
Adj flow		1518	800		1326	200				1208		1084
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
Lane group		T	R		T	R				L		R
Adj flow		1518	800		1326	200				1208		1084
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000					1.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG		T	R		T	R				L		R
So		1900	1900		1900	1900				1900		1900
Lanes	0	2	1	0	3	1	0	0	0	2	0	2
fW		1.000	1.000		1.000	1.000				1.000		1.000
fHV		0.980	0.980		0.980	0.980				0.980		0.980
fG		1.000	1.000		1.000	1.000				1.000		1.000
fP		1.000	1.000		1.000	1.000				1.000		1.000
fBB		1.000	1.000		1.000	1.000				1.000		1.000
fA		1.000	1.000		1.000	1.000				1.000		1.000
fLU		0.952	1.000		0.908	1.000				0.971		0.885
fRT		1.000	0.850		1.000	0.850						0.850
fLT		1.000			1.000					0.950		
Sec.												
fLpb		1.000			1.000					1.000		
fRpb		1.000	1.000		1.000	1.000						1.000
S		3547	1583		5074	1583				3437		2803
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio

Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1518	3547	#	0.43	0.44	1550	0.98
Right	R	800	1583		0.51	1.00	1583	0.51
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1326	5074		0.26	0.44	2217	0.60
Right	R	200	1583		0.13	1.00	1583	0.13
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	1208	3437		0.35	0.41	1407	0.86
Prot								
Perm								
Thru								
Right	R	1084	2803	#	0.39	0.41	1147	0.95

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.81
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.96

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.98	0.44	18.0	1.000	1550	0.48	18.1	0.0	36.1	D	23.7	C
R	0.51	1.00	0.0	0.950	1583	0.11	0.3	0.0	0.3	A		
Westbound												
T	0.60	0.44	13.9	1.000	2217	0.19	0.4	0.0	14.4	B	12.5	B
R	0.13	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Northbound												
Southbound												
L	0.86	0.41	17.5	1.000	1407	0.39	5.6	0.0	23.1	C		
											28.1	C
R	0.95	0.41	18.5	1.000	1147	0.46	15.3	0.0	33.8	C		

Intersection delay = 22.6 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	65.0 sec			
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				

Opposing lane util. factor, fLUo 0.908 0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts
Input
EB WB NB SB
Opposed by Single(S) or Multiple(M) lane approach
Cycle length, C 65.0 sec
Total actual green time for LT lane group, G (s)
Effective permitted green time for LT lane group, g(s)
Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT 0.000 0.000
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 0.908 0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns
EB WB NB SB
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Pedestrian flow rate, Vpedg (p/h)
OCCpedg
Opposing queue clearing green, gq (s)
Eff. ped. green consumed by opp. veh. queue, gq/gp

OCCpedu
Opposing flow rate, Vo (veh/h)
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion of left turns, PLT
Proportion of left turns using protected phase, PLTA
Left-turn adjustment, fLpb
Permitted Right Turns
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Conflicting bicycle volume, Vbic (bicycles/h)
Vpedg
OCCpedg
Effective green, g (s)
Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
T	0.0	0.00	18.3	18.0	0.00	0.0	0.0	36.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.3
Westbound								
	0.0						0.0	
T	0.0	0.00	18.3	13.9	0.00	0.0	0.0	14.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
L	0.0	0.00	19.2	17.5	0.00	0.0	0.0	23.1
	0.0						0.0	
R	0.0	0.00	19.2	18.5	0.00	0.0	0.0	33.8

Intersection Delay 22.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

LaneGroup	Eastbound T	Eastbound R	Westbound T	Westbound R	Northbound	Southbound L	Southbound R
Init Queue	0.0	0.0	0.0	0.0		0.0	0.0

Flow Rate		797	800		486	200						622		612				
So		1900	1900		1900	1900						1900		1900				
No.Lanes	0	2	1	0	3	1	0	0	0			2	0	2				
SL		1862	1583		1862	1583						1770		1584				
LnCapacity		814	1583		813	1583						724		648				
Flow Ratio		0.4	0.5		0.3	0.1						0.4		0.4				
v/c Ratio		0.98	0.51		0.60	0.13						0.86		0.94				
Grn Ratio		0.44	1.00		0.44	1.00						0.41		0.41				
I Factor		1.000			1.000							1.000						
AT or PVG		3	3		3	3						3		3				
Pltn Ratio		1.00	1.00		1.00	1.00						1.00		1.00				
PF2		1.00			1.00							1.00		1.00				
Q1		14.2			6.7							10.2		10.6				
kB		0.5	0.7		0.5	0.7						0.5		0.4				
Q2		6.1	0.8		0.7	0.1						2.4		4.0				
Q Average		20.2			7.4							12.6		14.6				
Q Spacing		25.0	25.0		25.0	25.0						25.0		25.0				
Q Storage		0	0		0	0						0		0				
Q S Ratio																		
70th Percentile Output:																		
fB%		1.2			1.2							1.2		1.2				
BOQ		23.5			8.8							14.8		17.1				
QSRatio																		
85th Percentile Output:																		
fB%		1.5			1.5							1.5		1.5				
BOQ		29.4			11.4							18.9		21.7				
QSRatio																		
90th Percentile Output:																		
fB%		1.5			1.7							1.6		1.6				
BOQ		31.3			12.4							20.4		23.3				
QSRatio																		
95th Percentile Output:																		
fB%		1.7			1.9							1.8		1.8				
BOQ		34.3			14.1							22.7		25.8				
QSRatio																		
98th Percentile Output:																		
fB%		1.9			2.3							2.1		2.0				
BOQ		38.7			16.8							26.3		29.6				
QSRatio																		

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 SB Ramps

Inter.: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Volume		1172	1070		1791	890				348		749
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			

	Peds					Peds			
WB	Left				SB	Left	A		
	Thru	A	A			Thru			
	Right	A	A			Right	A		
	Peds					Peds			
NB	Right				EB	Right	A		
SB	Right				WB	Right	A		
Green		18.1	6.7	0.0			19.7	0.0	
Yellow		4.0	4.0				3.5		
All Red		1.5	1.5				1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1791	3547	0.69	0.50	12.4	B	7.2	A
R	1583	1583	0.71	1.00	1.5	A		
Westbound								
T	2562	5074	0.74	0.50	12.8	B	8.8	A
R	1583	1583	0.59	1.00	0.6	A		
Northbound								
Southbound								
L	1128	3437	0.32	0.33	15.3	B		
							23.2	C
R	920	2803	0.86	0.33	26.9	C		

Intersection Delay = 10.8 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Macarthur at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 SB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1172	1070		1791	890				348		749
% Heavy Veh		2	2		2	2				2		2
PHF		0.95	0.95		0.95	0.95				0.95		0.95
PK 15 Vol		308	282		471	234				92		197
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900		1900	1900				1900		1900
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0
Adj Flow		1234	1126		1885	937				366		788
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000
Peds Bikes		0			0			0			0	

Buses	0	0	0	0				0	0		
%InProtPhase											

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0				0.0		0.0
Arriv. Type		3	3		3	3				3		3
Unit Ext.		3.0	3.0		3.0	3.0				3.0		3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0		2.0	2.0				2.0		2.0
Ext of g		2.0	2.0		2.0	2.0				2.0		2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
WB Left					SB Left	A			
Thru	A	A			Thru				
Right	A	A			Right	A			
Peds					Peds				
NB Right					EB Right	A			
SB Right					WB Right	A			
Green	18.1	6.7	0.0			19.7	0.0		
Yellow	4.0	4.0				3.5			
All Red	1.5	1.5				1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1172	1070		1791	890				348		749
PHF		0.95	0.95		0.95	0.95				0.95		0.95
Adj flow		1234	1126		1885	937				366		788
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
Lane group		T	R		T	R				L		R
Adj flow		1234	1126		1885	937				366		788
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R					L		R
So	1900	1900		1900	1900					1900		1900
Lanes	0 2	1	0	3	1	0	0	0	0	2	0	2
fW	1.000	1.000		1.000	1.000					1.000		1.000
fHV	0.980	0.980		0.980	0.980					0.980		0.980
fG	1.000	1.000		1.000	1.000					1.000		1.000
fP	1.000	1.000		1.000	1.000					1.000		1.000
fBB	1.000	1.000		1.000	1.000					1.000		1.000
fA	1.000	1.000		1.000	1.000					1.000		1.000
fLU	0.952	1.000		0.908	1.000					0.971		0.885
fRT	1.000	0.850		1.000	0.850							0.850
fLT	1.000			1.000						0.950		
Sec.												
fLpb	1.000			1.000						1.000		
fRpb	1.000	1.000		1.000	1.000							1.000
S	3547	1583		5074	1583					3437		2803
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio

Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1234	3547	0.35	0.50	1791	0.69	
Right	R	1126	1583	# 0.71	1.00	1583	0.71	
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1885	5074	0.37	0.50	2562	0.74	
Right	R	937	1583	0.59	1.00	1583	0.59	
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	366	3437	0.11	0.33	1128	0.32	
Prot								
Perm								
Thru								
Right	R	788	2803	0.28	0.33	920	0.86	

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.71
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.71

Control Delay and LOS Determination

Appr/ Lane	Ratios		Unf Del	Prog Adj	Lane Grp	Incremental Factor	Del	Res Del	Lane Group		Approach	
Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
T	0.69	0.50	11.3	1.000	1791	0.26	1.1	0.0	12.4	B	7.2	A
R	0.71	1.00	0.0	0.950	1583	0.27	1.5	0.0	1.5	A		
Westbound												
T	0.74	0.50	11.7	1.000	2562	0.29	1.1	0.0	12.8	B	8.8	A
R	0.59	1.00	0.0	0.950	1583	0.18	0.6	0.0	0.6	A		
Northbound												
Southbound												
L	0.32	0.33	15.1	1.000	1128	0.11	0.2	0.0	15.3	B		
											23.2	C
R	0.86	0.33	18.8	1.000	920	0.39	8.1	0.0	26.9	C		

Intersection delay = 10.8 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	60.0 sec			
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				

Opposing lane util. factor, fLUo 0.908 0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts
Input
EB WB NB SB
Opposed by Single(S) or Multiple(M) lane approach
Cycle length, C 60.0 sec
Total actual green time for LT lane group, G (s)
Effective permitted green time for LT lane group, g(s)
Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT 0.000 0.000
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 0.908 0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns
EB WB NB SB
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Pedestrian flow rate, Vpedg (p/h)
OCCpedg
Opposing queue clearing green, gq (s)
Eff. ped. green consumed by opp. veh. queue, gq/gp

OCCpedu
Opposing flow rate, Vo (veh/h)
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn

ApbT
Proportion of left turns, PLT
Proportion of left turns using protected phase, PLTA
Left-turn adjustment, fLpb
Permitted Right Turns
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Conflicting bicycle volume, Vbic (bicycles/h)
Vpedg
OCCpedg
Effective green, g (s)
Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
T	0.0	0.00	14.9	11.3	0.00	0.0	0.0	12.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.5
Westbound								
	0.0						0.0	
T	0.0	0.00	14.9	11.7	0.00	0.0	0.0	12.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.6
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
L	0.0	0.00	20.1	15.1	0.00	0.0	0.0	15.3
	0.0						0.0	
R	0.0	0.00	20.1	18.8	0.00	0.0	0.0	26.9

Intersection Delay 10.8 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	T	R	T	R		L		R

Init Queue		0.0	0.0		0.0	0.0						0.0		0.0		
Flow Rate		648	1126		691	937						188		445		
So		1900	1900		1900	1900						1900		1900		
No.Lanes	0	2	1	0	3	1	0	0	0			2	0	2		
SL		1862	1583		1862	1583						1770		1584		
LnCapacity		940	1583		940	1583						580		519		
Flow Ratio		0.3	0.7		0.4	0.6						0.1		0.3		
v/c Ratio		0.69	0.71		0.74	0.59						0.32		0.86		
Grn Ratio		0.50	1.00		0.50	1.00						0.33		0.33		
I Factor		1.000			1.000							1.000				
AT or PVG		3	3		3	3						3		3		
Pltn Ratio		1.00	1.00		1.00	1.00						1.00		1.00		
PF2		1.00			1.00							1.00		1.00		
Q1		8.2			9.1							2.4		6.9		
kB		0.5	0.7		0.5	0.7						0.4		0.4		
Q2		1.1	1.7		1.4	1.0						0.2		1.8		
Q Average		9.3			10.5							2.5		8.8		
Q Spacing		25.0	25.0		25.0	25.0						25.0		25.0		
Q Storage		0	0		0	0						0		0		
Q S Ratio																
70th Percentile Output:																
fB%		1.2			1.2							1.2		1.2		
BOQ		11.0			12.3							3.0		10.3		
QSRatio																
85th Percentile Output:																
fB%		1.5			1.5							1.6		1.5		
BOQ		14.2			15.8							4.0		13.4		
QSRatio																
90th Percentile Output:																
fB%		1.7			1.6							1.8		1.7		
BOQ		15.4			17.1							4.5		14.5		
QSRatio																
95th Percentile Output:																
fB%		1.9			1.8							2.0		1.9		
BOQ		17.3			19.2							5.1		16.4		
QSRatio																
98th Percentile Output:																
fB%		2.2			2.1							2.5		2.2		
BOQ		20.4			22.4							6.4		19.4		
QSRatio																

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 NB Ramps

Inter.: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Dyer Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L	LTR	R			
Volume		2695	550		1117	330	913	0	795			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru	A			
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right					EB Right	A			
SB Right					WB Right				
Green	47.7	13.5	0.0			54.2	0.0		
Yellow	4.0	4.0				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 130.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	2584	5074	1.10	0.51	82.7	F	68.7	E
R	1583	1583	0.37	1.00	0.1	A		
Westbound								
TR	2496	4901	0.61	0.51	23.2	C	23.2	C
Northbound								
L	738	1770	1.30	0.42	183.7	F		
LTR	777	1863	0.00	0.42	22.1	C	177.5	F
R	660	1583	1.27	0.42	170.3	F		
Southbound								

Intersection Delay = 87.4 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Dyer at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 NB Ramps N/S St: Dyer Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		2695	550		1117	330	913	0	795			
% Heavy Veh		2	2		2	2	2	2	2			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
PK 15 Vol		709	145		294	87	240	0	209			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900		1900	1900	1900			
ParkExist												
NumPark												
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L		LTR R			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			
Adj Flow		2837	579		1523		961	0	837			

%InSharedLn						0		0				
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.228			0.000	1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0		0	0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0		0.0	0.0	0.0			
Arriv. Type		3	3		3		3	3	3			
Unit Ext.		3.0	3.0		3.0		3.0	3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0		2.0	2.0	2.0			
Ext of g		2.0	2.0		2.0		2.0	2.0	2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right			
Green	47.7	13.5	0.0		54.2	0.0		
Yellow	4.0	4.0			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 130.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		2695	550		1117	330	913	0	795			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
Adj flow		2837	579		1176	347	961	0	837			
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
Lane group		T	R		TR		L	LTR	R			
Adj flow		2837	579		1523		961	0	837			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.228			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound		Northbound			Southbound		
LG	T	R		TR		L	LTR	R			
So	1900	1900		1900		1900	1900	1900			
Lanes	0 3	1	0	3	0	1	1	1	0	0	0
fW	1.000	1.000		1.000		1.000	1.000	1.000			
fHV	0.980	0.980		0.980		0.980	0.980	0.980			
fG	1.000	1.000		1.000		1.000	1.000	1.000			
fP	1.000	1.000		1.000		1.000	1.000	1.000			
fBB	1.000	1.000		1.000		1.000	1.000	1.000			
fA	1.000	1.000		1.000		1.000	1.000	1.000			
fLU	0.908	1.000		0.908		1.000	1.000	1.000			
fRT	1.000	0.850		0.966			1.000	0.850			
fLT	1.000			1.000		0.950	1.000				
Sec.											
fLpb	1.000			1.000		1.000	1.000				
fRpb	1.000	1.000		1.000			1.000	1.000			
S	5074	1583		4901		1770	1863	1583			
Sec.											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2837	5074	#	0.56	0.51	2584	1.10
Right	R	579	1583		0.37	1.00	1583	0.37
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1523	4901		0.31	0.51	2496	0.61
Right								
Northbound								
Prot								
Perm								
Left	L	961	1770	#	0.54	0.42	738	1.30
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.42	777	0.00
Right	R	837	1583		0.53	0.42	660	1.27
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.10
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.19

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	1.10	0.51	31.9	1.000	2584	0.50	50.8	0.0	82.7	F	68.7	E
R	0.37	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Westbound												
TR	0.61	0.51	22.7	1.000	2496	0.20	0.4	0.0	23.2	C	23.2	C
Northbound												
L	1.30	0.42	37.9	1.000	738	0.50	145.8	0.0	183.7	F		
LTR	0.00	0.42	22.1	1.000	777	0.11	0.0	0.0	22.1	C	177.5	F
R	1.27	0.42	37.9	1.000	660	0.50	132.4	0.0	170.3	F		
Southbound												

Intersection delay = 87.4 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C			130.0 sec	
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				

Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 0.908 0.908 1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts
Input
EB WB NB SB
Opposed by Single(S) or Multiple(M) lane approach
Cycle length, C 130.0 sec
Total actual green time for LT lane group, G (s)
Effective permitted green time for LT lane group, g(s)
Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT 0.000 0.000 0.000
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 0.908 0.908 1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns
EB WB NB SB
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)

Pedestrian flow rate, Vpedg (p/h)
OCCpedg
Opposing queue clearing green, gq (s)
Eff. ped. green consumed by opp. veh. queue, gq/gp
OCCpedu
Opposing flow rate, Vo (veh/h)
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn

ApbT
Proportion of left turns, PLT
Proportion of left turns using protected phase, PLTA
Left-turn adjustment, fLpb
Permitted Right Turns
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Conflicting bicycle volume, Vbic (bicycles/h)
Vpedg
OCCpedg
Effective green, g (s)
Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	130.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
T	0.0	0.00	31.9	31.9	0.00	63.2	0.0	82.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Westbound								
	0.0						0.0	
TR	0.0	0.00	31.9	22.7	0.00	0.0	0.0	23.2
	0.0						0.0	
Northbound								
L	0.0	0.00	37.9	37.9	0.00	55.8	0.0	183.7
LTR	0.0	0.00	37.9	22.1	0.00	0.0	0.0	22.1
R	0.0	0.00	37.9	37.9	0.00	44.2	0.0	170.3
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 87.4 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound	Northbound			Southbound		
LaneGroup	T	R	TR	L	LTR	R			
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0			
Flow Rate	1041	579	559	961	0	837			
So	1900	1900	1900	1900	1900	1900			
No.Lanes	3	1	3	1	1	1	0	0	0
SL	1862	1583	1799	1770	1863	1583			
LnCapacity	948	1583	916	738	777	660			
Flow Ratio	0.6	0.4	0.3	0.5	0.0	0.5			
v/c Ratio	1.10	0.37	0.61	1.30	0.00	1.27			
Grn Ratio	0.51	1.00	0.51	0.42	0.42	0.42			
I Factor	1.000		1.000		1.000				
AT or PVG	3	3	3	3	3	3			
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00			
PF2	1.00		1.00	1.00	1.00	1.00			
Q1	37.6		14.4	34.7	0.0	30.2			
kB	0.8	1.1	0.8	0.7	0.7	0.7			
Q2	17.7	0.7	1.2	30.7	0.0	24.9			
Q Average	55.3		15.6	65.4	0.0	55.2			
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0			
Q Storage	0	0	0	0	0	0			
Q S Ratio									
70th Percentile Output:									
fB%	1.1		1.2	1.1	1.2	1.1			
BOQ	62.2		18.2	73.2	0.0	62.1			
QSRatio									
85th Percentile Output:									
fB%	1.3		1.5	1.3	1.6	1.3			
BOQ	74.6		23.1	87.2	0.0	74.3			
QSRatio									
90th Percentile Output:									
fB%	1.4		1.6	1.4	1.8	1.4			
BOQ	78.9		24.7	92.5	0.0	78.6			
QSRatio									
95th Percentile Output:									
fB%	1.5		1.8	1.5	2.1	1.5			
BOQ	84.5		27.4	99.1	0.0	84.3			
QSRatio									
98th Percentile Output:									
fB%	1.7		2.0	1.7	2.7	1.7			
BOQ	94.8		31.2	112	0.0	94.6			
QSRatio									

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 NB Ramps

Inter.: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Dyer Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L	LTR	R			
Volume		1226	1020		1903	1470	287	0	104			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru	A			
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right					EB Right	A			
SB Right					WB Right				
Green	51.5	36.6	0.0			17.3	0.0		
Yellow	4.0	4.0				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	3937	5074	0.33	0.78	4.1	A	2.8	A
R	1583	1583	0.68	1.00	1.2	A		
Westbound								
TR	3679	4742	0.96	0.78	20.3	C	20.3	C
Northbound								
L	255	1770	1.18	0.14	166.9	F		
LTR	269	1863	0.00	0.14	43.9	D	135.5	F
R	228	1583	0.48	0.14	48.8	D		
Southbound								

Intersection Delay = 21.2 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Dyer at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 NB Ramps N/S St: Dyer Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1226	1020		1903	1470	287	0	104			
% Heavy Veh		2	2		2	2	2	2	2			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
PK 15 Vol		323	268		501	387	76	0	27			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900		1900	1900	1900			
ParkExist												
NumPark												
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
LGConfig		T	R		TR		L		LTR R			
Lane Width		12.0	12.0		12.0		12.0	12.0	12.0			
RTOR Vol			0			0			0			
Adj Flow		1291	1074		3550		302	0	109			

%InSharedLn			0	0	
Prop LTs	0.000	0.000	0.000		
Prop RTs	0.000 1.000	0.436	0.000 1.000		
Peds Bikes	0	0	0	0	
Buses	0 0	0	0 0 0		
%InProtPhase					

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0		0.0	0.0	0.0			
Arriv. Type		3	3		3		3	3	3			
Unit Ext.		3.0	3.0		3.0		3.0	3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0		2.0	2.0	2.0			
Ext of g		2.0	2.0		2.0		2.0	2.0	2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right			
Green	51.5	36.6	0.0		17.3	0.0		
Yellow	4.0	4.0			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1226	1020		1903	1470	287	0	104			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
Adj flow		1291	1074		2003	1547	302	0	109			
No. Lanes	0	3	1	0	3	0	1	1	1	0	0	0
Lane group		T	R		TR		L		LTR R			
Adj flow		1291	1074		3550		302	0	109			
Prop LTs		0.000			0.000			0.000				
Prop RTs	0.000	1.000		0.436			0.000	1.000				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound		Northbound			Southbound		
LG	T	R		TR		L	LTR	R			
So	1900	1900		1900		1900	1900	1900			
Lanes	0 3	1	0	3	0	1	1	1	0	0	0
fW	1.000	1.000		1.000		1.000	1.000	1.000			
fHV	0.980	0.980		0.980		0.980	0.980	0.980			
fG	1.000	1.000		1.000		1.000	1.000	1.000			
fP	1.000	1.000		1.000		1.000	1.000	1.000			
fBB	1.000	1.000		1.000		1.000	1.000	1.000			
fA	1.000	1.000		1.000		1.000	1.000	1.000			
fLU	0.908	1.000		0.908		1.000	1.000	1.000			
fRT	1.000	0.850		0.935			1.000	0.850			
fLT	1.000			1.000		0.950	1.000				
Sec.											
fLpb	1.000			1.000		1.000	1.000				
fRpb	1.000	1.000		1.000			1.000	1.000			
S	5074	1583		4742		1770	1863	1583			
Sec.											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1291	5074		0.25	0.78	3937	0.33
Right	R	1074	1583		0.68	1.00	1583	0.68
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	3550	4742	#	0.75	0.78	3679	0.96
Right								
Northbound								
Prot								
Perm								
Left	L	302	1770	#	0.17	0.14	255	1.18
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.14	269	0.00
Right	R	109	1583		0.07	0.14	228	0.48
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.92
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.00

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.33	0.78	4.0	1.000	3937	0.11	0.0	0.0	4.1	A	2.8	A
R	0.68	1.00	0.0	0.950	1583	0.25	1.2	0.0	1.2	A		
Westbound												
TR	0.96	0.78	12.0	1.000	3679	0.47	8.3	0.0	20.3	C	20.3	C
Northbound												
L	1.18	0.14	51.3	1.000	255	0.50	115.5	0.0	166.9	F		
LTR	0.00	0.14	43.9	1.000	269	0.11	0.0	0.0	43.9	D	135.5	F
R	0.48	0.14	47.2	1.000	228	0.11	1.6	0.0	48.8	D		
Southbound												

Intersection delay = 21.2 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	120.0 sec			
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				

Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 0.908 0.908 1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts
Input
EB WB NB SB
Opposed by Single(S) or Multiple(M) lane approach
Cycle length, C 120.0 sec
Total actual green time for LT lane group, G (s)
Effective permitted green time for LT lane group, g(s)
Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT 0.000 0.000 0.000
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 0.908 0.908 1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns
EB WB NB SB
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)

Pedestrian flow rate, Vpedg (p/h)
OCCpedg
Opposing queue clearing green, gq (s)
Eff. ped. green consumed by opp. veh. queue, gq/gp
OCCpedu
Opposing flow rate, Vo (veh/h)
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion of left turns, PLT
Proportion of left turns using protected phase, PLTA
Left-turn adjustment, fLpb
Permitted Right Turns
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Conflicting bicycle volume, Vbic (bicycles/h)
Vpedg
OCCpedg
Effective green, g (s)
Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 120.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
T	0.0	0.00	13.4	4.0	0.00	0.0	0.0	4.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.2
Westbound								
	0.0						0.0	
TR	0.0	0.00	13.4	12.0	0.00	0.0	0.0	20.3
	0.0						0.0	
Northbound								
L	0.0	0.00	51.3	51.3	0.00	11.8	0.0	166.9
LTR	0.0	0.00	51.3	43.9	0.00	0.0	0.0	43.9
R	0.0	0.00	51.3	47.2	0.00	0.0	0.0	48.8
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 21.2 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound	Northbound			Southbound
LaneGroup	T	R	TR	L	LTR	R	
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate	473	1074	1303	302	0	109	
So	1900	1900	1900	1900	1900	1900	
No.Lanes	0 3	1	0 3 0	1	1	1	0 0 0
SL	1862	1583	1740	1770	1863	1583	
LnCapacity	1445	1583	1350	255	269	228	
Flow Ratio	0.3	0.7	0.7	0.2	0.0	0.1	
v/c Ratio	0.33	0.68	0.97	1.18	0.00	0.48	
Grn Ratio	0.78	1.00	0.78	0.14	0.14	0.14	
I Factor	1.000		1.000		1.000		
AT or PVG	3	3	3	3	3	3	
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF2	1.00		1.00	1.00	1.00	1.00	
Q1	4.7		38.8	10.1	0.0	3.3	
kB	1.0	1.1	1.0	0.4	0.4	0.3	
Q2	0.5	2.2	10.0	7.7	0.0	0.3	
Q Average	5.2		48.8	17.7	0.0	3.6	
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage	0	0	0	0	0	0	
Q S Ratio							
70th Percentile Output:							
fB%	1.2		1.1	1.2	1.2	1.2	
BOQ	6.2		55.1	20.6	0.0	4.3	
QSRatio							
85th Percentile Output:							
fB%	1.6		1.4	1.5	1.6	1.6	
BOQ	8.1		66.3	26.0	0.0	5.7	
QSRatio							
90th Percentile Output:							
fB%	1.7		1.4	1.6	1.8	1.7	
BOQ	8.9		70.0	27.7	0.0	6.3	
QSRatio							
95th Percentile Output:							
fB%	1.9		1.5	1.7	2.1	2.0	
BOQ	10.2		75.2	30.6	0.0	7.2	
QSRatio							
98th Percentile Output:							
fB%	2.4		1.7	2.0	2.7	2.5	
BOQ	12.4		84.1	34.7	0.0	8.9	
QSRatio							

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: Pb
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 SB Ramps

Inter.: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Grand Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Volume				481		340		905			704	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right				
Peds					Peds				
WB Left	A				SB Left				
Thru					Thru	A	A		
Right	A				Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	22.2	0.0				10.3	12.0	0.0	
Yellow	3.6					4.0	4.0		
All Red	1.0					1.0	1.9		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	655	1770	0.77	0.37	22.4	C		
							20.3	C
R	586	1583	0.61	0.37	17.3	B		
Northbound								
T	1614	3547	0.59	0.45	12.8	B	12.8	B
Southbound								
T	2309	5074	0.32	0.45	10.5	B	10.5	B

Intersection Delay = 14.6 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	Pb
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Grand at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 SB Ramps N/S St: Grand Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				481	340		905			704		
% Heavy Veh				2	2		2			2		
PHF				0.95	0.95		0.95			0.95		
PK 15 Vol				127	89		238			185		
Hi Ln Vol												
% Grade				0			0			0		
Ideal Sat				1900	1900		1900			1900		
ParkExist												
NumPark												
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Adj Flow		506 358	953	741	
%InSharedLn					
Prop LTs			0.000	0.000	
Prop RTs		1.000	0.000	0.000	
Peds Bikes	0	0			
Buses		0 0	0	0	
%InProtPhase					

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0			0.0	
Arriv. Type				3		3		3			3	
Unit Ext.				3.0		3.0		3.0			3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0			2.0	
Ext of g				2.0		2.0		2.0			2.0	
Ped Min g		3.2			3.2							

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right				
Peds					Peds				
WB Left	A				SB Left				
Thru					Thru	A	A		
Right	A				Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	22.2	0.0				10.3	12.0	0.0	
Yellow	3.6					4.0	4.0		
All Red	1.0					1.0	1.9		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				481	340		905			704		
PHF				0.95	0.95		0.95			0.95		
Adj flow				506	358		953			741		
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
Lane group				L		R		T			T	
Adj flow				506	358		953			741		
Prop LTs							0.000			0.000		
Prop RTs					1.000		0.000			0.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG			L			R			T			T
So			1900			1900			1900			1900
Lanes	0	0	1	0		1	0		2	0	0	3 0
fW			1.000			1.000			1.000			1.000
fHV			0.980			0.980			0.980			0.980
fG			1.000			1.000			1.000			1.000
fP			1.000			1.000			1.000			1.000
fBB			1.000			1.000			1.000			1.000
fA			1.000			1.000			1.000			1.000
fLU			1.000			1.000			0.952			0.908
fRT						0.850			1.000			1.000
fLT			0.950						1.000			1.000
Sec.												
fLpb			1.000						1.000			1.000
fRpb						1.000			1.000			1.000
S			1770			1583			3547			5074
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Westbound							
Prot							
Perm							
Left	L	506	1770	# 0.29	0.37	655	0.77
Prot							
Perm							
Thru							
Right	R	358	1583	0.23	0.37	586	0.61
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	953	3547	# 0.27	0.45	1614	0.59
Right							
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	741	5074	0.15	0.45	2309	0.32
Right							

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.55
Total lost time per cycle, L = 10.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.67

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.77	0.37	16.7	1.000	655	0.32	5.7	0.0	22.4	C		
											20.3	C
R	0.61	0.37	15.4	1.000	586	0.20	1.9	0.0	17.3	B		
Northbound												
T	0.59	0.45	12.2	1.000	1614	0.18	0.6	0.0	12.8	B	12.8	B
Southbound												
T	0.32	0.45	10.4	1.000	2309	0.11	0.1	0.0	10.5	B	10.5	B

Intersection delay = 14.6 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	60.0 sec			
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				

Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 0.908 0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				

Conflicting pedestrian volume, Vped (p/h)
Pedestrian flow rate, Vpedg (p/h)
OCCpedg
Opposing queue clearing green, gq (s)
Eff. ped. green consumed by opp. veh. queue, gq/gp
OCCpedu
Opposing flow rate, Vo (veh/h)
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn

ApbT
Proportion of left turns, PLT
Proportion of left turns using protected phase, PLTA
Left-turn adjustment, fLpb
Permitted Right Turns
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Conflicting bicycle volume, Vbic (bicycles/h)
Vpedg
OCCpedg
Effective green, g (s)
Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay ds	Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	18.9	16.7	0.00	0.0	0.0	22.4
	0.0						0.0	
R	0.0	0.00	18.9	15.4	0.00	0.0	0.0	17.3
Northbound								
	0.0						0.0	
T	0.0	0.00	16.4	12.2	0.00	0.0	0.0	12.8
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	16.4	10.4	0.00	0.0	0.0	10.5
	0.0						0.0	

Intersection Delay 14.6 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound		Northbound	Southbound
LaneGroup		L	R	T	T
Init Queue		0.0	0.0	0.0	0.0
Flow Rate		506	358	500	272
So		1900	1900	1900	1900
No.Lanes	0 0 0	1 0	1	0 2 0	0 3 0
SL		1770	1583	1862	1862
LnCapacity		655	586	847	847
Flow Ratio		0.3	0.2	0.3	0.1
v/c Ratio		0.77	0.61	0.59	0.32
Grn Ratio		0.37	0.37	0.45	0.45
I Factor		1.000		1.000	1.000
AT or PVG		3	3	3	3
Pltn Ratio		1.00	1.00	1.00	1.00
PF2		1.00	1.00	1.00	1.00
Q1		7.4	4.9	6.2	2.9
kB		0.4	0.4	0.5	0.5
Q2		1.3	0.6	0.7	0.2
Q Average		8.8	5.5	6.9	3.1
Q Spacing		25.0	25.0	25.0	25.0
Q Storage		0	0	0	0
Q S Ratio					
70th Percentile Output:					
fB%		1.2	1.2	1.2	1.2
BOQ		10.4	6.5	8.2	3.7
QSRatio					
85th Percentile Output:					
fB%		1.5	1.6	1.5	1.6
BOQ		13.4	8.5	10.6	4.9
QSRatio					
90th Percentile Output:					
fB%		1.7	1.7	1.7	1.7
BOQ		14.5	9.3	11.6	5.4
QSRatio					
95th Percentile Output:					
fB%		1.9	1.9	1.9	2.0
BOQ		16.4	10.6	13.2	6.3
QSRatio					
98th Percentile Output:					
fB%		2.2	2.4	2.3	2.5
BOQ		19.4	12.9	15.8	7.8
QSRatio					

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Baseline + Exist. GP Buildout
E/W St: SR-55 SB Ramps

Inter.: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Grand Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Volume				330		240		820			710	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	20.7	0.0			9.7	14.1	0.0	
Yellow	3.6				4.0	4.0		
All Red	1.0				1.0	1.9		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	611	1770	0.57	0.34	17.3	B		
							16.7	B
R	546	1583	0.46	0.34	15.9	B		
Northbound								
T	1703	3547	0.51	0.48	11.0	B	11.0	B
Southbound								
T	2436	5074	0.31	0.48	9.6	A	9.6	A

Intersection Delay = 12.1 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Grand at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Baseline + Exist. GP Buildout

E/W St: SR-55 SB Ramps N/S St: Grand Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				330		240		820			710	
% Heavy Veh				2		2		2			2	
PHF				0.95		0.95		0.95			0.95	
PK 15 Vol				87		63		216			187	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900			1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						
Adj Flow				347		253		863			747	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	
Peds Bikes	0			0								
Buses				0		0		0			0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0			0.0	
Arriv. Type				3		3		3			3	
Unit Ext.				3.0		3.0		3.0			3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0			2.0	
Ext of g				2.0		2.0		2.0			2.0	
Ped Min g		3.2			3.2							

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		20.7	0.0			9.7	14.1	0.0
Yellow		3.6				4.0	4.0	
All Red		1.0				1.0	1.9	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				330		240		820			710	
PHF				0.95		0.95		0.95			0.95	
Adj flow				347		253		863			747	
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
Lane group				L		R		T			T	
Adj flow				347		253		863			747	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T			T		
So			1900		1900		1900			1900		
Lanes	0	0	1	0	1	0	2	0	0	3	0	
fW			1.000		1.000		1.000			1.000		
fHV			0.980		0.980		0.980			0.980		
fG			1.000		1.000		1.000			1.000		
fP			1.000		1.000		1.000			1.000		
fBB			1.000		1.000		1.000			1.000		
fA			1.000		1.000		1.000			1.000		
fLU			1.000		1.000		0.952			0.908		
fRT					0.850		1.000			1.000		
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000			1.000		
S			1770		1583		3547			5074		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	347	1770	#	0.20	0.34	611	0.57
Prot								
Perm								
Thru								
Right	R	253	1583		0.16	0.34	546	0.46
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	863	3547	#	0.24	0.48	1703	0.51
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	747	5074		0.15	0.48	2436	0.31
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.44
Total lost time per cycle, L = 10.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.53

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.57	0.34	16.0	1.000	611	0.16	1.3	0.0	17.3	B		
											16.7	B
R	0.46	0.34	15.3	1.000	546	0.11	0.6	0.0	15.9	B		
Northbound												
T	0.51	0.48	10.7	1.000	1703	0.12	0.3	0.0	11.0	B	11.0	B
Southbound												

T	0.31	0.48	9.5	1.000	2436	0.11	0.1	0.0	9.6	A	9.6	A

Intersection delay = 12.1 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.6	16.0	0.00	0.0	0.0	17.3
	0.0						0.0	
R	0.0	0.00	19.6	15.3	0.00	0.0	0.0	15.9
Northbound								
	0.0						0.0	
T	0.0	0.00	15.6	10.7	0.00	0.0	0.0	11.0
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	15.6	9.5	0.00	0.0	0.0	9.6
	0.0						0.0	

Intersection Delay 12.1 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound		Northbound	Southbound
LaneGroup		L	R	T	T
Init Queue		0.0	0.0	0.0	0.0
Flow Rate		347	253	453	274
So		1900	1900	1900	1900
No.Lanes	0 0 0	1 0 1		0 2 0	0 3 0
SL		1770	1583	1862	1862
LnCapacity		611	546	894	894
Flow Ratio		0.2	0.2	0.2	0.1
v/c Ratio		0.57	0.46	0.51	0.31
Grn Ratio		0.34	0.34	0.48	0.48
I Factor		1.000		1.000	1.000
AT or PVG		3	3	3	3
Pltn Ratio		1.00	1.00	1.00	1.00
PF2		1.00	1.00	1.00	1.00
Q1		4.7	3.3	5.2	2.8
kB		0.4	0.4	0.5	0.5
Q2		0.5	0.3	0.5	0.2
Q Average		5.2	3.6	5.7	3.0
Q Spacing		25.0	25.0	25.0	25.0
Q Storage		0	0	0	0
Q S Ratio					
70th Percentile Output:					
fB%		1.2	1.2	1.2	1.2
BOQ		6.2	4.3	6.8	3.6
QSRatio					
85th Percentile Output:					
fB%		1.6	1.6	1.5	1.6
BOQ		8.1	5.7	8.8	4.7
QSRatio					
90th Percentile Output:					
fB%		1.7	1.7	1.7	1.7
BOQ		8.9	6.3	9.7	5.2
QSRatio					
95th Percentile Output:					
fB%		1.9	2.0	1.9	2.0
BOQ		10.2	7.2	11.0	6.0
QSRatio					
98th Percentile Output:					
fB%		2.4	2.5	2.3	2.5
BOQ		12.4	8.9	13.4	7.5
QSRatio					

ERROR MESSAGES

No errors to report.

Appendix I-8 **Post-2030 Cumulative Baseline With Project (MPAH Network) HCS Intersection Worksheets**

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 SB Ramps

Inter.: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Volume	527		398					1258	243		2199	325
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	12.2	0.0				16.7	15.1	0.0	
Yellow	3.6					3.6	4.3		
All Red	1.5					1.5	1.5		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	980	4820	0.57	0.20	22.3	C		
							24.5	C
R	570	2803	0.74	0.20	27.3	C		
Westbound								
Northbound								
T	3121	5074	0.42	0.62	6.1	A	5.1	A
R	1583	1583	0.16	1.00	0.0+	A		
Southbound								
T	3121	5074	0.74	0.62	9.2	A	8.0	A
R	1583	1583	0.22	1.00	0.1	A		

Intersection Delay = 10.2 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Culver at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: I-5 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	527	398						1258	243		2199	325
% Heavy Veh	2	2						2	2		2	2
PHF	0.95	0.95						0.95	0.95		0.95	0.95
PK 15 Vol	139	105						331	64		579	86
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900						1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	555		419					1324	256		2315	342
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	12.2	0.0			16.7	15.1	0.0	
Yellow	3.6				3.6	4.3		
All Red	1.5				1.5	1.5		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	527	398						1258	243		2199	325
PHF	0.95	0.95						0.95	0.95		0.95	0.95
Adj flow	555	419						1324	256		2315	342
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
Lane group	L		R					T	R		T	R
Adj flow	555		419					1324	256		2315	342
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound					Westbound					Northbound			Southbound	
LG	L		R								T	R		T	R
So	1900		1900								1900	1900		1900	1900
Lanes	3	0	2	0	0	0	0				3	1	0	3	1
fW	1.000		1.000								1.000	1.000		1.000	1.000
fHV	0.980		0.980								0.980	0.980		0.980	0.980
fG	1.000		1.000								1.000	1.000		1.000	1.000
fP	1.000		1.000								1.000	1.000		1.000	1.000
fBB	1.000		1.000								1.000	1.000		1.000	1.000
fA	1.000		1.000								1.000	1.000		1.000	1.000
fLU	0.908		0.885								0.908	1.000		0.908	1.000
fRT			0.850								1.000	0.850		1.000	0.850
fLT	0.950										1.000			1.000	
Sec.															
fLpb	1.000										1.000			1.000	
fRpb			1.000								1.000	1.000		1.000	1.000
S	4820		2803								5074	1583		5074	1583
Sec.															

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	555	4820		0.12	0.20	980	0.57
Prot								
Perm								
Thru								
Right	R	419	2803	#	0.15	0.20	570	0.74
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1324	5074		0.26	0.62	3121	0.42
Right	R	256	1583		0.16	1.00	1583	0.16
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2315	5074	#	0.46	0.62	3121	0.74
Right	R	342	1583		0.22	1.00	1583	0.22

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.61
Total lost time per cycle, L = 10.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.74

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.57	0.20	21.5	1.000	980	0.16	0.8	0.0	22.3	C		
											24.5	C
R	0.74	0.20	22.4	1.000	570	0.29	4.9	0.0	27.3	C		
Westbound												
Northbound												
T	0.42	0.62	6.0	1.000	3121	0.11	0.1	0.0	6.1	A	5.1	A
R	0.16	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Southbound												

T	0.74	0.62	8.2	1.000	3121	0.30	1.0	0.0	9.2	A	8.0	A
R	0.22	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 10.2 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	23.9	21.5	0.00	0.0	0.0	22.3

	0.0						0.0	
R	0.0	0.00	23.9	22.4	0.00	0.0	0.0	27.3
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	11.5	6.0	0.00	0.0	0.0	6.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Southbound								
	0.0						0.0	
T	0.0	0.00	11.5	8.2	0.00	0.0	0.0	9.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 10.2 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	203	236			486	256	849	342
So	1900	1900			1900	1900	1900	1900
No.Lanes	3 0	2	0 0	0	3	1	3	1
SL	1769	1584			1862	1583	1862	1583
LnCapacity	359	322			1145	1583	1145	1583
Flow Ratio	0.1	0.1			0.3	0.2	0.5	0.2
v/c Ratio	0.57	0.73			0.42	0.16	0.74	0.22
Grn Ratio	0.20	0.20			0.62	1.00	0.62	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	3.0	3.7			4.2		10.0	
kB	0.3	0.3			0.6	0.7	0.6	0.7
Q2	0.4	0.7			0.4	0.1	1.6	0.2
Q Average	3.4	4.4			4.7		11.6	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	4.1	5.2			5.5		13.7	
QSRatio								
85th Percentile Output:								
fB%	1.6	1.6			1.6		1.5	
BOQ	5.4	6.8			7.2		17.5	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.7			1.7		1.6	
BOQ	5.9	7.6			8.0		18.9	
QSRatio								
95th Percentile Output:								
fB%	2.0	2.0			2.0		1.8	
BOQ	6.8	8.6			9.1		21.1	
QSRatio								
98th Percentile Output:								
fB%	2.5	2.4			2.4		2.1	
BOQ	8.4	10.6			11.2		24.5	
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 SB Ramps

Inter.: Culver at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Volume	1008		921					2032	300		1499	250
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	29.8	0.0				23.0	11.2	0.0	
Yellow	3.6					3.6	4.3		
All Red	1.5					1.5	1.5		

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1795	4820	0.59	0.37	20.7	C		
							28.9	C
R	1044	2803	0.93	0.37	37.9	D		
Westbound								
Northbound								
T	2493	5074	0.86	0.49	21.1	C	18.4	B
R	1583	1583	0.20	1.00	0.1	A		
Southbound								
T	2493	5074	0.63	0.49	15.6	B	13.3	B
R	1583	1583	0.17	1.00	0.0+	A		

Intersection Delay = 20.3 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Culver at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: I-5 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	1008		921					2032	300		1499	250
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	265		242					535	79		394	66
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	1061		969					2139	316		1578	263
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	29.8	0.0			23.0	11.2	0.0	
Yellow	3.6				3.6	4.3		
All Red	1.5				1.5	1.5		

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	1008		921					2032	300		1499	250
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	1061		969					2139	316		1578	263
No. Lanes	3	0	2	0	0	0	0	3	1	0	3	1
Lane group	L		R					T	R		T	R
Adj flow	1061		969					2139	316		1578	263
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound				Northbound			Southbound	
LG	L		R				T	R		T	R
So	1900		1900				1900	1900		1900	1900
Lanes	3	0	2	0	0	0	3	1	0	3	1
fW	1.000		1.000				1.000	1.000		1.000	1.000
fHV	0.980		0.980				0.980	0.980		0.980	0.980
fG	1.000		1.000				1.000	1.000		1.000	1.000
fP	1.000		1.000				1.000	1.000		1.000	1.000
fBB	1.000		1.000				1.000	1.000		1.000	1.000
fA	1.000		1.000				1.000	1.000		1.000	1.000
fLU	0.908		0.885				0.908	1.000		0.908	1.000
fRT			0.850				1.000	0.850		1.000	0.850
fLT	0.950						1.000			1.000	
Sec.											
fLpb	1.000						1.000			1.000	
fRpb			1.000				1.000	1.000		1.000	1.000
S	4820		2803				5074	1583		5074	1583
Sec.											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	1061	4820		0.22	0.37	1795	0.59
Prot								
Perm								
Thru								
Right	R	969	2803	#	0.35	0.37	1044	0.93
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2139	5074	#	0.42	0.49	2493	0.86
Right	R	316	1583		0.20	1.00	1583	0.20
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1578	5074		0.31	0.49	2493	0.63
Right	R	263	1583		0.17	1.00	1583	0.17

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.77
Total lost time per cycle, L = 10.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.89

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.59	0.37	20.2	1.000	1795	0.18	0.5	0.0	20.7	C		
											28.9	C
R	0.93	0.37	24.1	1.000	1044	0.44	13.8	0.0	37.9	D		
Westbound												
Northbound												
T	0.86	0.49	17.9	1.000	2493	0.39	3.2	0.0	21.1	C	18.4	B
R	0.20	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.63	0.49	15.0	1.000	2493	0.21	0.5	0.0	15.6	B	13.3	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		

Intersection delay = 20.3 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	80.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	80.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT				0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	25.1	20.2	0.00	0.0	0.0	20.7

	0.0						0.0	
R	0.0	0.00	25.1	24.1	0.00	0.0	0.0	37.9
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	20.4	17.9	0.00	0.0	0.0	21.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	20.4	15.0	0.00	0.0	0.0	15.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+

Intersection Delay 20.3 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	389	547			785	316	579	263
So	1900	1900			1900	1900	1900	1900
No.Lanes	3 0 2		0 0 0		0 3	1	0 3	1
SL	1769	1584			1862	1583	1862	1583
LnCapacity	658	589			915	1583	915	1583
Flow Ratio	0.2	0.3			0.4	0.2	0.3	0.2
v/c Ratio	0.59	0.93			0.86	0.20	0.63	0.17
Grn Ratio	0.37	0.37			0.49	1.00	0.49	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	7.0	11.7			15.3		9.5	
kB	0.5	0.5			0.6	0.8	0.6	0.8
Q2	0.7	3.6			3.1	0.2	1.0	0.2
Q Average	7.7	15.3			18.4		10.5	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	9.1	17.8			21.4		12.4	
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5			1.5		1.5	
BOQ	11.7	22.6			27.0		15.9	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.6			1.6		1.6	
BOQ	12.8	24.2			28.7		17.2	
QSRatio								
95th Percentile Output:								
fB%	1.9	1.8			1.7		1.8	
BOQ	14.5	26.8			31.6		19.3	
QSRatio								
98th Percentile Output:								
fB%	2.3	2.0			1.9		2.1	
BOQ	17.3	30.7			35.8		22.6	
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 NB Ramps

Inter.: Jamboree at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Volume				1129	0	514		1336	670		1911	470
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	51.9	0.0				16.2	6.7	0.0
Yellow	3.6					4.3	4.3	
All Red	1.0					1.0	1.0	

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1021	1770	1.16	0.58	103.6	F		
LTR	1074	1863	0.00	0.58	8.1	A	75.3	E
R	913	1583	0.59	0.58	13.3	B		
Northbound								
T	2120	6765	0.66	0.31	27.6	C	18.4	B
R	1583	1583	0.45	1.00	0.2	A		
Southbound								
T	2120	6765	0.95	0.31	40.3	D	32.4	C
R	1583	1583	0.31	1.00	0.1	A		

Intersection Delay = 39.4 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: I-5 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1129	0	514		1336	670		1911	470
% Heavy Veh				2	2	2		2	2		2	2
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
PK 15 Vol				297	0	135		352	176		503	124
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0		12.0	12.0
RTOR Vol						0				0			0
Adj Flow				1188	0	541			1406	705		2012	495
%InSharedLn				0		0							
Prop LTs					0.000				0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000	
Peds Bikes	0				0			0			0		
Buses				0	0	0		0	0		0	0	
%InProtPhase													

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0		0.0	0.0
Arriv. Type				3	3	3		3	3		3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		51.9	0.0			16.2	6.7	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 90.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1129	0	514		1336	670		1911	470
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
Adj flow				1188	0	541		1406	705		2012	495
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
Lane group				L		LTR	R		T	R		T	R
Adj flow				1188	0	541			1406	705		2012	495
Prop LTs					0.000				0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L	LTR	R		T	R		T	R	
So			1900	1900	1900		1900	1900		1900	1900	
Lanes	0	0	1	1	1	0	4	1	0	4	1	
fW			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fHV			0.980	0.980	0.980		0.980	0.980		0.980	0.980	
fG			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fP			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fBB			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fA			1.000	1.000	1.000		1.000	1.000		1.000	1.000	
fLU			1.000	1.000	1.000		0.908	1.000		0.908	1.000	
fRT				1.000	0.850		1.000	0.850		1.000	0.850	
fLT			0.950	1.000			1.000			1.000		
Sec.												
fLpb			1.000	1.000			1.000			1.000		
fRpb				1.000	1.000		1.000	1.000		1.000	1.000	
S			1770	1863	1583		6765	1583		6765	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	1188	1770	#	0.67	0.58	1021	1.16
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.58	1074	0.00
Right	R	541	1583		0.34	0.58	913	0.59
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1406	6765		0.21	0.31	2120	0.66
Right	R	705	1583		0.45	1.00	1583	0.45
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2012	6765	#	0.30	0.31	2120	0.95
Right	R	495	1583		0.31	1.00	1583	0.31

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.97
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.09

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.16	0.58	19.0	1.000	1021	0.50	84.5	0.0	103.6	F		
LTR	0.00	0.58	8.1	1.000	1074	0.11	0.0	0.0	8.1	A	75.3	E
R	0.59	0.58	12.3	1.000	913	0.18	1.0	0.0	13.3	B		
Northbound												
T	0.66	0.31	26.8	1.000	2120	0.24	0.8	0.0	27.6	C	18.4	B
R	0.45	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.95	0.31	30.2	1.000	2120	0.46	10.1	0.0	40.3	D	32.4 C
R	0.31	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A	

Intersection delay = 39.4 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	90.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	90.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	90.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.0	19.0	0.00	41.8	0.0	103.6
LTR	0.0	0.00	19.0	8.1	0.00	0.0	0.0	8.1
R	0.0	0.00	19.0	12.3	0.00	0.0	0.0	13.3
Northbound								
	0.0						0.0	
T	0.0	0.00	30.9	26.8	0.00	0.0	0.0	27.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	30.9	30.2	0.00	0.0	0.0	40.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 39.4 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	LTR	R	T	R		T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate				1188	0	541	387	705		553	495	
So				1900	1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0	1	1	1	0 4	1	0	4	1	
SL				1770	1863	1583	1862	1583		1862	1583	
LnCapacity				1021	1074	913	583	1583		583	1583	
Flow Ratio				0.7	0.0	0.3	0.2	0.4		0.3	0.3	
v/c Ratio				1.16	0.00	0.59	0.66	0.45		0.95	0.31	
Grn Ratio				0.58	0.58	0.58	0.31	1.00		0.31	1.00	
I Factor					1.000		1.000			1.000		
AT or PVG				3	3	3	3	3		3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
PF2				1.00	1.00	1.00	1.00			1.00		
Q1				29.7	0.0	8.7	8.4			13.5		
kB				0.7	0.7	0.7	0.5	0.9		0.5	0.9	
Q2				25.0	0.0	0.9	0.9	0.7		4.3	0.4	
Q Average				54.7	0.0	9.6	9.3			17.8		
Q Spacing				25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage				0	0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.1	1.2	1.2	1.2			1.2		
BOQ				61.6	0.0	11.3	11.0			20.7		
QSRatio												
85th Percentile Output:												
fB%				1.3	1.6	1.5	1.5			1.5		
BOQ				73.8	0.0	14.6	14.2			26.1		
QSRatio												
90th Percentile Output:												
fB%				1.4	1.8	1.6	1.7			1.6		
BOQ				78.0	0.0	15.9	15.4			27.8		
QSRatio												
95th Percentile Output:												
fB%				1.5	2.1	1.9	1.9			1.7		
BOQ				83.7	0.0	17.8	17.3			30.7		
QSRatio												
98th Percentile Output:												
fB%				1.7	2.7	2.2	2.2			2.0		
BOQ				93.8	0.0	21.0	20.4			34.8		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 NB Ramps

Inter.: Jamboree at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Volume				339	0	982		2638	680		1761	480
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	44.2	0.0				14.1	21.5	0.0
Yellow	3.6					4.3	4.3	
All Red	1.0					1.0	1.0	

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	824	1770	0.43	0.47	17.4	B		
LTR	867	1863	0.00	0.47	13.6	B	164.2	F
R	737	1583	1.40	0.47	214.9	F		
Northbound								
T	2913	6765	0.95	0.43	34.5	C	27.5	C
R	1583	1583	0.45	1.00	0.2	A		
Southbound								
T	2913	6765	0.64	0.43	21.7	C	17.1	B
R	1583	1583	0.32	1.00	0.1	A		

Intersection Delay = 50.3 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Jamboree at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: I-5 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				339	0	982		2638	680		1761	480
% Heavy Veh				2	2	2		2	2		2	2
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
PK 15 Vol				89	0	258		694	179		463	126
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
LGConfig				L		LTR	R		T	R		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0		12.0	12.0
RTOR Vol						0				0			0
Adj Flow				357	0	1034		2777	716		1854	505
%InSharedLn				0		0						
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0		0.0	0.0
Arriv. Type				3	3	3		3	3		3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru		A			Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		44.2	0.0			14.1	21.5	0.0
Yellow		3.6				4.3	4.3	
All Red		1.0				1.0	1.0	

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				339	0	982		2638	680		1761	480
PHF				0.95	0.95	0.95		0.95	0.95		0.95	0.95
Adj flow				357	0	1034		2777	716		1854	505
No. Lanes	0	0	0		1	1	1	0	4	1	0	4	1
Lane group				L		LTR	R		T	R		T	R
Adj flow				357	0	1034		2777	716		1854	505
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	LTR	R		T	R		T	R
So				1900	1900	1900		1900	1900		1900	1900
Lanes	0	0	0	1	1	1	0	4	1	0	4	1
fW				1.000	1.000	1.000		1.000	1.000		1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980		0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000		1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000		1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000		1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000		1.000	1.000
fLU				1.000	1.000	1.000		0.908	1.000		0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000			1.000	
Sec.												
fLpb				1.000	1.000			1.000			1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				1770	1863	1583		6765	1583		6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	357	1770		0.20	0.47	824	0.43
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.47	867	0.00
Right	R	1034	1583	#	0.65	0.47	737	1.40
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2777	6765	#	0.41	0.43	2913	0.95
Right	R	716	1583		0.45	1.00	1583	0.45
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1854	6765		0.27	0.43	2913	0.64
Right	R	505	1583		0.32	1.00	1583	0.32

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.06
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.19

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	Ratios g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Incremental Del d2	Res Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound												
Westbound												
L	0.43	0.47	17.0	1.000	824	0.11	0.4	0.0	17.4	B		
LTR	0.00	0.47	13.6	1.000	867	0.11	0.0	0.0	13.6	B	164.2	F
R	1.40	0.47	25.4	1.000	737	0.50	189.5	0.0	214.9	F		
Northbound												
T	0.95	0.43	26.1	1.000	2913	0.46	8.4	0.0	34.5	C	27.5	C
R	0.45	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

T	0.64	0.43	21.2	1.000	2913	0.22	0.5	0.0	21.7	C	17.1	B
R	0.32	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 50.3 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

			EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0	sec				
Adj. LT vol from Vol Adjustment Worksheet, v						
v/c ratio from Capacity Worksheet, X						
Protected phase effective green interval, g (s)						
Opposing queue effective green interval, gq						
Unopposed green interval, gu						
Red time r=(C-g-gq-gu)						
Arrival rate, qa=v/(3600(max[X,1.0]))						
Protected ph. departure rate, Sp=s/3600						
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)						
XPerm						
XProt						
Case						
Queue at beginning of green arrow, Qa						
Queue at beginning of unsaturated green, Qu						
Residual queue, Qr						
Uniform Delay, d1						

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	25.4	17.0	0.00	0.0	0.0	17.4
LTR	0.0	0.00	25.4	13.6	0.00	0.0	0.0	13.6
R	0.0	0.00	25.4	25.4	0.00	74.3	0.0	214.9
Northbound								
	0.0						0.0	
T	0.0	0.00	27.1	26.1	0.00	0.0	0.0	34.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	27.1	21.2	0.00	0.0	0.0	21.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 50.3 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup				L	LTR	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				357	0	1034	764	716	510	505
So				1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	1	1	1	0 4	1	0 4	1
SL				1770	1863	1583	1862	1583	1862	1583
LnCapacity				824	867	737	802	1583	802	1583
Flow Ratio				0.2	0.0	0.7	0.4	0.5	0.3	0.3
v/c Ratio				0.43	0.00	1.40	0.95	0.45	0.64	0.32
Grn Ratio				0.47	0.47	0.47	0.43	1.00	0.43	1.00
I Factor					1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00	1.00		1.00	
Q1				6.3	0.0	27.3	19.5		10.6	
kB				0.6	0.7	0.6	0.6	0.9	0.6	0.9
Q2				0.5	0.0	39.1	5.7	0.8	1.1	0.4
Q Average				6.8	0.0	66.4	25.2		11.6	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%				1.2	1.2	1.1	1.2		1.2	
BOQ				8.0	0.0	74.3	29.0		13.6	
QSRatio										
85th Percentile Output:										
fB%				1.5	1.6	1.3	1.4		1.5	
BOQ				10.5	0.0	88.5	36.0		17.5	
QSRatio										
90th Percentile Output:										
fB%				1.7	1.8	1.4	1.5		1.6	
BOQ				11.4	0.0	93.9	38.1		18.9	
QSRatio										
95th Percentile Output:										
fB%				1.9	2.1	1.5	1.6		1.8	
BOQ				13.0	0.0	101	41.5		21.1	
QSRatio										
98th Percentile Output:										
fB%				2.3	2.7	1.7	1.8		2.1	
BOQ				15.6	0.0	113	46.4		24.5	
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 SB Ramps

Inter.: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Volume	494		936					1520	405		2242	623
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	24.4	0.0				7.8	12.6	0.0
Yellow	3.6					4.3	4.3	
All Red	1.0					1.0	1.0	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1398	3437	0.37	0.41	12.6	B		
							19.7	B
R	1140	2803	0.86	0.41	23.4	C		
Westbound								
Northbound								
T	2898	6765	0.55	0.43	13.1	B	10.3	B
R	1583	1583	0.27	1.00	0.1	A		
Southbound								
T	2898	6765	0.81	0.43	16.9	B	13.3	B
R	1583	1583	0.41	1.00	0.2	A		

Intersection Delay = 13.8 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: I-5 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	494		936					1520	405		2242	623
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	130		246					400	107		590	164
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	520		985					1600	426		2360	656
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	24.4	0.0			7.8	12.6	0.0	
Yellow	3.6				4.3	4.3		
All Red	1.0				1.0	1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	494		936					1520	405		2242	623
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	520		985					1600	426		2360	656
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
Lane group	L		R					T	R		T	R
Adj flow	520		985					1600	426		2360	656
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound					Westbound					Northbound			Southbound	
LG	L		R								T	R		T	R
So	1900		1900								1900	1900		1900	1900
Lanes	2	0	2	0	0	0	0				4	1	0	4	1
fW	1.000		1.000								1.000	1.000		1.000	1.000
fHV	0.980		0.980								0.980	0.980		0.980	0.980
fG	1.000		1.000								1.000	1.000		1.000	1.000
fP	1.000		1.000								1.000	1.000		1.000	1.000
fBB	1.000		1.000								1.000	1.000		1.000	1.000
fA	1.000		1.000								1.000	1.000		1.000	1.000
fLU	0.971		0.885								0.908	1.000		0.908	1.000
fRT			0.850								1.000	0.850		1.000	0.850
fLT	0.950										1.000			1.000	
Sec.															
fLpb	1.000										1.000			1.000	
fRpb			1.000								1.000	1.000		1.000	1.000
S	3437		2803								6765	1583		6765	1583
Sec.															

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	520	3437		0.15	0.41	1398	0.37
Prot								
Perm								
Thru								
Right	R	985	2803	#	0.35	0.41	1140	0.86
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1600	6765		0.24	0.43	2898	0.55
Right	R	426	1583		0.27	1.00	1583	0.27
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2360	6765	#	0.35	0.43	2898	0.81
Right	R	656	1583		0.41	1.00	1583	0.41

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.70
Total lost time per cycle, L = 9.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.84

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.37	0.41	12.4	1.000	1398	0.11	0.2	0.0	12.6	B		
											19.7	B
R	0.86	0.41	16.3	1.000	1140	0.39	7.1	0.0	23.4	C		
Westbound												
Northbound												
T	0.55	0.43	12.8	1.000	2898	0.15	0.2	0.0	13.1	B	10.3	B
R	0.27	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.81	0.43	15.1	1.000	2898	0.36	1.9	0.0	16.9	B	13.3	B
R	0.41	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 13.8 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	17.8	12.4	0.00	0.0	0.0	12.6

	0.0						0.0	
R	0.0	0.00	17.8	16.3	0.00	0.0	0.0	23.4
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	17.1	12.8	0.00	0.0	0.0	13.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	17.1	15.1	0.00	0.0	0.0	16.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 13.8 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	L	R			T	R	T	R
Init Queue	0.0	0.0			0.0	0.0	0.0	0.0
Flow Rate	267	556			440	426	649	656
So	1900	1900			1900	1900	1900	1900
No.Lanes	2 0 2		0 0 0		0 4	1	0 4	1
SL	1770	1584			1862	1583	1862	1583
LnCapacity	719	644			797	1583	797	1583
Flow Ratio	0.2	0.4			0.2	0.3	0.3	0.4
v/c Ratio	0.37	0.86			0.55	0.27	0.81	0.41
Grn Ratio	0.41	0.41			0.43	1.00	0.43	1.00
I Factor	1.000				1.000		1.000	
AT or PVG	3	3			3	3	3	3
Pltn Ratio	1.00	1.00			1.00	1.00	1.00	1.00
PF2	1.00	1.00			1.00		1.00	
Q1	3.1	8.5			5.5		9.5	
kB	0.4	0.4			0.5	0.7	0.5	0.7
Q2	0.3	2.2			0.6	0.3	1.9	0.5
Q Average	3.4	10.7			6.1		11.4	
Q Spacing	25.0	25.0			25.0	25.0	25.0	25.0
Q Storage	0	0			0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2			1.2		1.2	
BOQ	4.0	12.5			7.2		13.4	
QSRatio								
85th Percentile Output:								
fB%	1.6	1.5			1.5		1.5	
BOQ	5.3	16.1			9.4		17.1	
QSRatio								
90th Percentile Output:								
fB%	1.7	1.6			1.7		1.6	
BOQ	5.9	17.4			10.3		18.5	
QSRatio								
95th Percentile Output:								
fB%	2.0	1.8			1.9		1.8	
BOQ	6.7	19.5			11.7		20.7	
QSRatio								
98th Percentile Output:								
fB%	2.5	2.1			2.3		2.1	
BOQ	8.3	22.8			14.1		24.1	
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 SB Ramps

Inter.: Jamboree at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Volume	674		745					2546	1090		1645	510
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	19.3	0.0				10.1	15.4	0.0	
Yellow	3.6					4.3	4.3		
All Red	1.0					1.0	1.0		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	1106	3437	0.64	0.32	18.7	B		
							23.7	C
R	902	2803	0.87	0.32	28.3	C		
Westbound								
Northbound								
T	3473	6765	0.77	0.51	12.9	B	9.5	A
R	1583	1583	0.72	1.00	1.7	A		
Southbound								
T	3473	6765	0.50	0.51	9.7	A	7.4	A
R	1583	1583	0.34	1.00	0.1	A		

Intersection Delay = 11.7 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Jamboree at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	674		745					2546	1090		1645	510
% Heavy Veh	2		2					2	2		2	2
PHF	0.95		0.95					0.95	0.95		0.95	0.95
PK 15 Vol	177		196					670	287		433	134
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900		1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
LGConfig	L		R					T	R		T	R
Lane Width	12.0		12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	709		784					2680	1147		1732	537
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0		0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0		0.0					0.0	0.0		0.0	0.0
Arriv. Type	3		3					3	3		3	3
Unit Ext.	3.0		3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0		2.0					2.0	2.0		2.0	2.0
Ext of g	2.0		2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	19.3	0.0				10.1	15.4	0.0	
Yellow	3.6					4.3	4.3		
All Red	1.0					1.0	1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	674		745					2546	1090		1645	510
PHF	0.95		0.95					0.95	0.95		0.95	0.95
Adj flow	709		784					2680	1147		1732	537
No. Lanes	2	0	2	0	0	0	0	4	1	0	4	1
Lane group	L		R					T	R		T	R
Adj flow	709		784					2680	1147		1732	537
Prop LTs								0.000			0.000	
Prop RTs			1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound				Northbound				Southbound			
LG	L		R						T		R		T		R	
So	1900		1900						1900		1900		1900		1900	
Lanes	2	0	2	0	0	0	0		4		1	0	4		1	
fW	1.000		1.000						1.000		1.000		1.000		1.000	
fHV	0.980		0.980						0.980		0.980		0.980		0.980	
fG	1.000		1.000						1.000		1.000		1.000		1.000	
fP	1.000		1.000						1.000		1.000		1.000		1.000	
fBB	1.000		1.000						1.000		1.000		1.000		1.000	
fA	1.000		1.000						1.000		1.000		1.000		1.000	
fLU	0.971		0.885						0.908		1.000		0.908		1.000	
fRT			0.850						1.000		0.850		1.000		0.850	
fLT	0.950								1.000				1.000			
Sec.																
fLpb	1.000								1.000				1.000			
fRpb			1.000						1.000		1.000		1.000		1.000	
S	3437		2803						6765		1583		6765		1583	
Sec.																

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	709	3437		0.21	0.32	1106	0.64
Prot								
Perm								
Thru								
Right	R	784	2803		0.28	0.32	902	0.87
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2680	6765		0.40	0.51	3473	0.77
Right	R	1147	1583	#	0.72	1.00	1583	0.72
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1732	6765		0.26	0.51	3473	0.50
Right	R	537	1583		0.34	1.00	1583	0.34

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.72
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.72

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.64	0.32	17.4	1.000	1106	0.22	1.3	0.0	18.7	B		
											23.7	C
R	0.87	0.32	19.2	1.000	902	0.40	9.1	0.0	28.3	C		
Westbound												
Northbound												
T	0.77	0.51	11.8	1.000	3473	0.32	1.1	0.0	12.9	B	9.5	A
R	0.72	1.00	0.0	0.950	1583	0.29	1.7	0.0	1.7	A		
Southbound												

T	0.50	0.51	9.6	1.000	3473	0.11	0.1	0.0	9.7	A	7.4	A
R	0.34	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 11.7 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				

EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec

Eastbound								
L	0.0	0.00	20.3	17.4	0.00	0.0	0.0	18.7
	0.0						0.0	
R	0.0	0.00	20.3	19.2	0.00	0.0	0.0	28.3
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	14.6	11.8	0.00	0.0	0.0	12.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.7
Southbound								
	0.0						0.0	
T	0.0	0.00	14.6	9.6	0.00	0.0	0.0	9.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 11.7 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound	
LaneGroup	L		R				T	R		T	R
Init Queue	0.0		0.0				0.0	0.0		0.0	0.0
Flow Rate	365		442				737	1147		476	537
So	1900		1900				1900	1900		1900	1900
No.Lanes	2	0	2	0	0	0	4	1	0	4	1
SL	1770		1584				1862	1583		1862	1583
LnCapacity	569		509				956	1583		956	1583
Flow Ratio	0.2		0.3				0.4	0.7		0.3	0.3
v/c Ratio	0.64		0.87				0.77	0.72		0.50	0.34
Grn Ratio	0.32		0.32				0.51	1.00		0.51	1.00
I Factor	1.000						1.000			1.000	
AT or PVG	3		3				3	3		3	3
Pltn Ratio	1.00		1.00				1.00	1.00		1.00	1.00
PF2	1.00		1.00				1.00			1.00	
Q1	5.2		6.9				9.9			5.2	
kB	0.4		0.4				0.5	0.7		0.5	0.7
Q2	0.7		1.9				1.7	1.8		0.5	0.4
Q Average	5.9		8.9				11.6			5.7	
Q Spacing	25.0		25.0				25.0	25.0		25.0	25.0
Q Storage	0		0				0	0		0	0
Q S Ratio											
70th Percentile Output:											
fB%	1.2		1.2				1.2			1.2	
BOQ	7.0		10.5				13.6			6.8	
QSRatio											
85th Percentile Output:											
fB%	1.5		1.5				1.5			1.5	
BOQ	9.1		13.5				17.4			8.8	
QSRatio											
90th Percentile Output:											
fB%	1.7		1.7				1.6			1.7	
BOQ	10.0		14.7				18.8			9.7	
QSRatio											
95th Percentile Output:											
fB%	1.9		1.9				1.8			1.9	
BOQ	11.4		16.6				21.0			11.0	
QSRatio											
98th Percentile Output:											
fB%	2.3		2.2				2.1			2.3	
BOQ	13.7		19.6				24.4			13.4	
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 NB Ramps

Inter.: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L		T			T R
Volume	140	0	425				330	920			2465	40
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right	A				WB Right				
Green	27.8	0.0				12.6	37.9	20.8	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	410	1770	0.36	0.23	39.2	D		
LTR	432	1863	0.00	0.23	35.4	D	135.0	F
R	367	1583	1.22	0.23	166.5	F		
Westbound								
Northbound								
L	361	3437	0.96	0.10	90.6	F		
T	3438	5074	0.28	0.68	7.8	A	29.6	C
Southbound								
T	2727	5074	0.95	0.54	34.9	C	34.3	C
R	1583	1583	0.03	1.00	0.0+	A		

Intersection Delay = 46.1 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Tustin Ranch at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: I-5 NB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	140	0	425				330	920			2465	40
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	37	0	112				87	242			649	11
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	147	0	447				347	968			2595	42
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru	A	A	A
Right		A			Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right		A			WB Right			
Green		27.8	0.0			12.6	37.9	20.8	0.0
Yellow		3.6				3.2	4.3	4.3	
All Red		1.5				1.0	1.5	1.5	

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	140	0	425				330	920			2465	40
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	147	0	447				347	968			2595	42
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	147	0	447				347	968			2595	42
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound						Westbound						Northbound						Southbound					
LG	L		LTR	R									L		T				T		R			
So	1900		1900	1900									1900		1900				1900		1900			
Lanes	1		1		0		0		0				2		3		0		0		3		1	
fW	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fHV	0.980		0.980	0.980									0.980		0.980						0.980		0.980	
fG	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fP	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fBB	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fA	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fLU	1.000		1.000	1.000									0.971		0.908						0.908		1.000	
fRT			1.000	0.850											1.000						1.000		0.850	
fLT	0.950		1.000										0.950		1.000						1.000			
Sec.																								
fLpb	1.000		1.000										1.000		1.000						1.000			
fRpb			1.000	1.000											1.000						1.000		1.000	
S	1770		1863	1583									3437		5074						5074		1583	
Sec.																								

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	147	1770		0.08	0.23	410	0.36
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.23	432	0.00
Right	R	447	1583	#	0.28	0.23	367	1.22
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	347	3437	#	0.10	0.10	361	0.96
Prot								
Perm								
Thru	T	968	5074		0.19	0.68	3438	0.28
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2595	5074	#	0.51	0.54	2727	0.95
Right	R	42	1583		0.03	1.00	1583	0.03

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.89
Total lost time per cycle, L = 15.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.02

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.36	0.23	38.6	1.000	410	0.11	0.5	0.0	39.2	D		
LTR	0.00	0.23	35.4	1.000	432	0.11	0.0	0.0	35.4	D	135.0	F
R	1.22	0.23	46.1	1.000	367	0.50	120.4	0.0	166.5	F		
Westbound												
Northbound												
L	0.96	0.10	53.5	1.000	361	0.47	37.1	0.0	90.6	F		
T	0.28	0.68	7.7	1.000	3438	0.11	0.0	0.0	7.8	A	29.6	C
Southbound												

T	0.95	0.54	26.3	1.000	2727	0.46	8.6	0.0	34.9	C	34.3	C
R	0.03	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		

Intersection delay = 46.1 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	120.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	120.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	120.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	46.1	38.6	0.00	0.0	0.0	39.2

LTR	0.0	0.00	46.1	35.4	0.00	0.0	0.0	35.4
R	0.0	0.00	46.1	46.1	0.00	20.0	0.0	166.5
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	53.7	53.5	0.00	0.0	0.0	90.6
T	0.0	0.00	19.4	7.7	0.00	0.0	0.0	7.8
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	27.8	26.3	0.00	0.0	0.0	34.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+

Intersection Delay 46.1 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	147	0	447				178	355		952	42	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	410	432	367				185	1262		1001	1583	
Flow Ratio	0.1	0.0	0.3				0.1	0.2		0.5	0.0	
v/c Ratio	0.36	0.00	1.22				0.96	0.28		0.95	0.03	
Grn Ratio	0.23	0.23	0.23				0.10	0.68		0.54	1.00	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00		
Q1	4.1	0.0	14.9				5.9	4.7		30.0		
kB	0.5	0.5	0.4				0.3	0.9		0.8	1.1	
Q2	0.3	0.0	12.1				2.2	0.4		7.3	0.0	
Q Average	4.4	0.0	27.0				8.1	5.1		37.3		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.1		
BOQ	5.2	0.0	31.0				9.6	6.0		42.5		
QSRatio												
85th Percentile Output:												
fB%	1.6	1.6	1.4				1.5	1.6		1.4		
BOQ	6.8	0.0	38.4				12.4	7.9		51.7		
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8	1.5				1.7	1.7		1.5		
BOQ	7.5	0.0	40.6				13.5	8.7		54.5		
QSRatio												
95th Percentile Output:												
fB%	2.0	2.1	1.6				1.9	2.0		1.6		
BOQ	8.6	0.0	44.1				15.2	9.9		58.8		
QSRatio												
98th Percentile Output:												
fB%	2.4	2.7	1.8				2.2	2.4		1.8		
BOQ	10.6	0.0	49.2				18.1	12.1		65.5		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 NB Ramps

Inter.: Tustin Ranch at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	311	0	277				661	1599			1003	459
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0								0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right	A				WB Right				
Green	15.4	0.0				15.1	4.6	9.0	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	1.5					1.0	1.5	1.5	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	419	1770	0.78	0.24	32.4	C		
LTR	441	1863	0.00	0.24	18.9	B	32.8	C
R	375	1583	0.78	0.24	33.2	C		
Westbound								
Northbound								
L	798	3437	0.87	0.23	34.5	C		
T	3021	5074	0.56	0.60	8.2	A	15.9	B
Southbound								
T	1514	5074	0.70	0.30	21.6	C	14.9	B
R	1583	1583	0.31	1.00	0.1	A		

Intersection Delay = 17.8 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Tustin Ranch at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: I-5 NB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	311	0	277				661	1599			1003	459
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	82	0	73				174	421			264	121
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0								0	
Adj Flow	327	0	292				696	1683			1056	483
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left	A		
Thru		A			Thru	A	A	A
Right		A			Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right		A			WB Right			
Green		15.4	0.0			15.1	4.6	9.0	0.0
Yellow		3.6				3.2	4.3	4.3	
All Red		1.5				1.0	1.5	1.5	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	311	0	277				661	1599			1003	459
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	327	0	292				696	1683			1056	483
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	327	0	292				696	1683			1056	483
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound						Westbound						Northbound						Southbound					
LG	L		LTR	R									L		T				T		R			
So	1900		1900	1900									1900		1900				1900		1900			
Lanes	1		1		0		0		0				2		3		0		0		3		1	
fW	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fHV	0.980		0.980	0.980									0.980		0.980						0.980		0.980	
fG	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fP	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fBB	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fA	1.000		1.000	1.000									1.000		1.000						1.000		1.000	
fLU	1.000		1.000	1.000									0.971		0.908						0.908		1.000	
fRT			1.000	0.850											1.000						1.000		0.850	
fLT	0.950		1.000										0.950		1.000						1.000			
Sec.																								
fLpb	1.000		1.000										1.000		1.000						1.000			
fRpb			1.000	1.000											1.000						1.000		1.000	
S	1770		1863	1583									3437		5074						5074		1583	
Sec.																								

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	327	1770	#	0.18	0.24	419	0.78
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.24	441	0.00
Right	R	292	1583		0.18	0.24	375	0.78
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	696	3437	#	0.20	0.23	798	0.87
Prot								
Perm								
Thru	T	1683	5074		0.33	0.60	3021	0.56
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1056	5074	#	0.21	0.30	1514	0.70
Right	R	483	1583		0.31	1.00	1583	0.31

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.60
Total lost time per cycle, L = 15.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.78

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.78	0.24	23.2	1.000	419	0.33	9.2	0.0	32.4	C		
LTR	0.00	0.24	18.9	1.000	441	0.11	0.0	0.0	18.9	B	32.8	C
R	0.78	0.24	23.2	1.000	375	0.33	10.0	0.0	33.2	C		
Westbound												
Northbound												
L	0.87	0.23	24.0	1.000	798	0.40	10.4	0.0	34.5	C		
T	0.56	0.60	8.0	1.000	3021	0.15	0.2	0.0	8.2	A	15.9	B
Southbound												

T	0.70	0.30	20.2	1.000	1514	0.26	1.4	0.0	21.6	C	14.9	B
R	0.31	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 17.8 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	24.8	23.2	0.00	0.0	0.0	32.4

LTR	0.0	0.00	24.8	18.9	0.00	0.0	0.0	18.9
R	0.0	0.00	24.8	23.2	0.00	0.0	0.0	33.2
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	24.9	24.0	0.00	0.0	0.0	34.5
T	0.0	0.00	13.2	8.0	0.00	0.0	0.0	8.2
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	22.8	20.2	0.00	0.0	0.0	21.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 17.8 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	327	0	292				358	617		387	483	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	0 3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	419	441	375				410	1109		555	1583	
Flow Ratio	0.2	0.0	0.2				0.2	0.3		0.2	0.3	
v/c Ratio	0.78	0.00	0.78				0.87	0.56		0.70	0.31	
Grn Ratio	0.24	0.24	0.24				0.23	0.60		0.30	1.00	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00		
Q1	5.5	0.0	4.9				6.2	6.7		6.2		
kB	0.3	0.3	0.3				0.3	0.6		0.4	0.7	
Q2	1.1	0.0	1.0				1.8	0.7		0.9	0.3	
Q Average	6.6	0.0	5.9				8.0	7.5		7.1		
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.2	1.2	1.2				1.2	1.2		1.2		
BOQ	7.8	0.0	7.0				9.5	8.9		8.4		
QSRatio												
85th Percentile Output:												
fB%	1.5	1.6	1.5				1.5	1.5		1.5		
BOQ	10.2	0.0	9.2				12.3	11.5		10.9		
QSRatio												
90th Percentile Output:												
fB%	1.7	1.8	1.7				1.7	1.7		1.7		
BOQ	11.2	0.0	10.1				13.4	12.5		11.9		
QSRatio												
95th Percentile Output:												
fB%	1.9	2.1	1.9				1.9	1.9		1.9		
BOQ	12.7	0.0	11.5				15.1	14.2		13.5		
QSRatio												
98th Percentile Output:												
fB%	2.3	2.7	2.3				2.2	2.3		2.3		
BOQ	15.2	0.0	13.9				18.0	16.9		16.1		
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 SB Ramps

Inter.: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	711	0	848				163	943			2321	573
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	51.6	0.0				5.5	47.2	10.3	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 132.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	692	1770	1.08	0.39	98.4	F		
LTR	728	1863	0.00	0.39	24.5	C	180.0	F
R	619	1583	1.44	0.39	248.5	F		
Westbound								
Northbound								
L	143	3437	1.20	0.04	203.2	F		
T	2748	5074	0.36	0.54	17.3	B	44.8	D
Southbound								
T	2395	5074	1.02	0.47	58.5	E	54.1	D
R	747	1583	0.81	0.47	36.3	D		

Intersection Delay = 87.5 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: I-5 SB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	711	0	848				163	943			2321	573
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	187	0	223				43	248			611	151
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0
Adj Flow	748	0	893				172	993			2443	603
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	51.6	0.0				5.5	47.2	10.3	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 132.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	711	0	848				163	943			2321	573
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
Adj flow	748	0	893				172	993			2443	603
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
Lane group	L		LTR	R			L	T			T	R
Adj flow	748	0	893				172	993			2443	603
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				L	T		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	2	3	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.971	0.908		0.908	1.000	
fRT		1.000	0.850					1.000		1.000	0.850	
fLT	0.950	1.000					0.950	1.000		1.000		
Sec.												
fLpb	1.000	1.000					1.000	1.000		1.000		
fRpb		1.000	1.000					1.000		1.000	1.000	
S	1770	1863	1583				3437	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	748	1770		0.42	0.39	692	1.08
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.39	728	0.00
Right	R	893	1583	#	0.56	0.39	619	1.44
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	172	3437	#	0.05	0.04	143	1.20
Prot								
Perm								
Thru	T	993	5074		0.20	0.54	2748	0.36
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2443	5074	#	0.48	0.47	2395	1.02
Right	R	603	1583		0.38	0.47	747	0.81

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.10
Total lost time per cycle, L = 12.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.21

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.08	0.39	40.2	1.000	692	0.50	58.2	0.0	98.4	F		
LTR	0.00	0.39	24.5	1.000	728	0.11	0.0	0.0	24.5	C	180.0	F
R	1.44	0.39	40.2	1.000	619	0.50	208.3	0.0	248.5	F		
Westbound												
Northbound												
L	1.20	0.04	63.3	1.000	143	0.50	139.9	0.0	203.2	F		
T	0.36	0.54	17.2	1.000	2748	0.11	0.1	0.0	17.3	B	44.8	D
Southbound												

T	1.02	0.47	34.8	1.000	2395	0.50	23.6	0.0	58.5	E	54.1 D
R	0.81	0.47	29.7	1.000	747	0.35	6.6	0.0	36.3	D	

Intersection delay = 87.5 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 132.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 132.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	132.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	40.2	40.2	0.00	14.0	0.0	98.4

LTR	0.0	0.00	40.2	24.5	0.00	0.0	0.0	24.5
R	0.0	0.00	40.2	40.2	0.00	68.5	0.0	248.5
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	63.3	63.3	0.00	7.2	0.0	203.2
T	0.0	0.00	30.2	17.2	0.00	0.0	0.0	17.3
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	34.8	34.8	0.00	12.0	0.0	58.5
R	0.0	0.00	34.8	29.7	0.00	0.0	0.0	36.3

Intersection Delay 87.5 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup	L	LTR	R				L	T		T	R	
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Flow Rate	748	0	893				88	364		896	603	
So	1900	1900	1900				1900	1900		1900	1900	
No.Lanes	1	1	1	0	0	0	2	3	0	0 3	1	
SL	1770	1863	1583				1770	1862		1862	1583	
LnCapacity	692	728	619				73	1008		879	747	
Flow Ratio	0.4	0.0	0.6				0.0	0.2		0.5	0.4	
v/c Ratio	1.08	0.00	1.44				1.21	0.36		1.02	0.81	
Grn Ratio	0.39	0.39	0.39				0.04	0.54		0.47	0.47	
I Factor		1.000						1.000		1.000		
AT or PVG	3	3	3				3	3		3	3	
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
PF2	1.00	1.00	1.00				1.00	1.00		1.00	1.00	
Q1	27.4	0.0	32.7				3.2	7.6		32.9	18.9	
kB	0.7	0.7	0.7				0.2	0.9		0.8	0.7	
Q2	12.3	0.0	36.3				2.6	0.5		10.6	2.7	
Q Average	39.7	0.0	69.0				5.9	8.1		43.5	21.5	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0	
Q Storage	0	0	0				0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%	1.1	1.2	1.1				1.2	1.2		1.1	1.2	
BOQ	45.2	0.0	77.1				7.0	9.6		49.3	24.9	
QSRatio												
85th Percentile Output:												
fB%	1.4	1.6	1.3				1.5	1.5		1.4	1.4	
BOQ	54.8	0.0	91.8				9.1	12.4		59.6	31.1	
QSRatio												
90th Percentile Output:												
fB%	1.5	1.8	1.4				1.7	1.7		1.4	1.5	
BOQ	57.8	0.0	97.5				10.0	13.5		62.8	33.1	
QSRatio												
95th Percentile Output:												
fB%	1.6	2.1	1.5				1.9	1.9		1.6	1.7	
BOQ	62.2	0.0	104				11.3	15.2		67.5	36.2	
QSRatio												
98th Percentile Output:												
fB%	1.7	2.7	1.7				2.3	2.2		1.7	1.9	
BOQ	69.4	0.0	118				13.7	18.1		75.4	40.7	
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 SB Ramps

Inter.: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Tustin Ranch Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Volume	590	0	491				244	1778			965	332
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A				Thru	A	A	A	
Right	A				Right				
Peds					Peds				
WB Left					SB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	22.1	0.0				6.2	5.8	5.5	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 57.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
L	686	1770	0.91	0.39	32.1	C		
LTR	722	1863	0.00	0.39	10.7	B	29.4	C
R	614	1583	0.84	0.39	26.1	C		
Westbound								
Northbound								
L	374	3437	0.69	0.11	29.7	C		
T	2314	5074	0.81	0.46	15.6	B	17.3	B
Southbound								
T	1433	5074	0.71	0.28	20.0-	B	21.9	C
R	447	1583	0.78	0.28	27.5	C		

Intersection Delay = 21.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB

Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Tustin Ranch at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 SB Ramps N/S St: Tustin Ranch Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	590	0	491				244	1778			965	332
% Heavy Veh	2	2	2				2	2			2	2
PHF	0.95	0.95	0.95				0.95	0.95			0.95	0.95
PK 15 Vol	155	0	129				64	468			254	87
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900				1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	2	3	0	0	3	1
LGConfig	L		LTR	R			L	T			T	R
Lane Width	12.0	12.0	12.0				12.0	12.0			12.0	12.0
RTOR Vol			0								0	
Adj Flow	621	0	517				257	1872			1016	349
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000			0.000	1.000
Peds Bikes	0			0						0		
Buses	0	0	0				0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0				0.0	0.0			0.0	0.0
Arriv. Type	3	3	3				3	3			3	3
Unit Ext.	3.0	3.0	3.0				3.0	3.0			3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ext of g	2.0	2.0	2.0				2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right			
Peds					Peds			
WB Left					SB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	22.1	0.0				6.2	5.8	5.5	0.0
Yellow	3.6					3.2	4.3	4.3	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 57.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	590	0	491				244	1778			965	332

PHF	0.95	0.95	0.95						0.95	0.95				0.95	0.95		
Adj flow	621	0	517						257	1872				1016	349		
No. Lanes	1	1	1		0	0	0		2	3	0		0	3	1		
Lane group	L	LTR	R						L	T				T	R		
Adj flow	621	0	517						257	1872				1016	349		
Prop LTs		0.000								0.000				0.000			
Prop RTs		0.000	1.000							0.000				0.000	1.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound						Westbound						Northbound						Southbound					
LG	L		LTR	R									L		T				T		R			
So	1900		1900	1900									1900		1900				1900		1900			
Lanes	1		1		0		0		0				2		3		0		3		1			
fW	1.000		1.000	1.000									1.000		1.000				1.000		1.000			
fHV	0.980		0.980	0.980									0.980		0.980				0.980		0.980			
fG	1.000		1.000	1.000									1.000		1.000				1.000		1.000			
fP	1.000		1.000	1.000									1.000		1.000				1.000		1.000			
fBB	1.000		1.000	1.000									1.000		1.000				1.000		1.000			
fA	1.000		1.000	1.000									1.000		1.000				1.000		1.000			
fLU	1.000		1.000	1.000									0.971		0.908				0.908		1.000			
fRT			1.000	0.850											1.000				1.000		0.850			
fLT	0.950		1.000										0.950		1.000				1.000					
Sec.																								
fLpb	1.000		1.000										1.000		1.000				1.000					
fRpb			1.000	1.000											1.000				1.000		1.000			
S	1770		1863	1583									3437		5074				5074		1583			
Sec.																								

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	621	1770	#	0.35	0.39	686	0.91
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.39	722	0.00
Right	R	517	1583		0.33	0.39	614	0.84
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left	L	257	3437		0.07	0.11	374	0.69
Prot								
Perm								
Thru	T	1872	5074	#	0.37	0.46	2314	0.81
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1016	5074		0.20	0.28	1433	0.71
Right	R	349	1583		0.22	0.28	447	0.78

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.72
Total lost time per cycle, L = 8.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.85

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.91	0.39	16.5	1.000	686	0.43	15.6	0.0	32.1	C		
LTR	0.00	0.39	10.7	1.000	722	0.11	0.0	0.0	10.7	B	29.4	C
R	0.84	0.39	15.9	1.000	614	0.38	10.3	0.0	26.1	C		
Westbound												

```
Northbound
L    0.69  0.11  24.5  1.000 374   0.26   5.2   0.0   29.7   C
T    0.81  0.46  13.4  1.000 2314  0.35   2.3   0.0   15.6   B    17.3   B

Southbound

T    0.71  0.28  18.3  1.000 1433  0.27   1.7   0.0   20.0-  B    21.9   C
R    0.78  0.28  18.8  1.000 447   0.33   8.7   0.0   27.5   C
_____________________________________________________________________________
         Intersection delay = 21.6  (sec/veh)   Intersection LOS = C


_____________________SUPPLEMENTAL PERMITTED LT WORKSHEET_____________________
                            for exclusive lefts
Input
                                                        EB    WB    NB    SB
Opposed by Single(S) or Multiple(M) lane approach
Cycle length, C                          57.0    sec
Total actual green time for LT lane group, G (s)
Effective permitted green time for LT lane group, g(s)
Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo                              1.000 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g  or  fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____________________SUPPLEMENTAL PERMITTED LT WORKSHEET_____________________
                              for shared lefts
Input
                                                        EB    WB    NB    SB
Opposed by Single(S) or Multiple(M) lane approach
Cycle length, C                          57.0    sec
Total actual green time for LT lane group, G (s)
Effective permitted green time for LT lane group, g(s)
Opposing effective green time, go (s)
Number of lanes in LT lane group, N
Number of lanes in opposing approach, No
Adjusted LT flow rate, VLT (veh/h)
Proportion of LT in LT lane group, PLT                 0.000       0.000 0.000
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo                              1.000 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
```

Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 57.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	17.5	16.5	0.00	0.0	0.0	32.1
LTR	0.0	0.00	17.5	10.7	0.00	0.0	0.0	10.7
R	0.0	0.00	17.5	15.9	0.00	0.0	0.0	26.1
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
L	0.0	0.00	25.4	24.5	0.00	0.0	0.0	29.7
T	0.0	0.00	15.5	13.4	0.00	0.0	0.0	15.6
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	20.4	18.3	0.00	0.0	0.0	20.0-
R	0.0	0.00	20.4	18.8	0.00	0.0	0.0	27.5

Intersection Delay 21.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound	
LaneGroup	L	LTR	R				L	T		T	R
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0
Flow Rate	621	0	517				132	687		372	349
So	1900	1900	1900				1900	1900		1900	1900
No.Lanes	1	1	1	0	0	0	2	3	0	3	1
SL	1770	1863	1583				1770	1862		1862	1583
LnCapacity	686	722	614				192	849		526	447
Flow Ratio	0.4	0.0	0.3				0.1	0.4		0.2	0.2
v/c Ratio	0.91	0.00	0.84				0.69	0.81		0.71	0.78
Grn Ratio	0.39	0.39	0.39				0.11	0.46		0.28	0.28
I Factor		1.000						1.000		1.000	
AT or PVG	3	3	3				3	3		3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00
PF2	1.00	1.00	1.00				1.00	1.00		1.00	1.00
Q1	9.3	0.0	7.4				2.0	9.4		5.3	5.1
kB	0.4	0.4	0.4				0.2	0.5		0.4	0.3
Q2	2.9	0.0	1.8				0.4	1.8		0.8	1.1
Q Average	12.2	0.0	9.3				2.4	11.2		6.1	6.1
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0
Q Storage	0	0	0				0	0		0	0
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2	1.2				1.2	1.2		1.2	1.2
BOQ	14.3	0.0	10.9				2.9	13.2		7.2	7.3
QSRatio											
85th Percentile Output:											
fB%	1.5	1.6	1.5				1.6	1.5		1.5	1.5
BOQ	18.3	0.0	14.1				3.8	16.9		9.4	9.5
QSRatio											
90th Percentile Output:											
fB%	1.6	1.8	1.7				1.8	1.6		1.7	1.7
BOQ	19.7	0.0	15.3				4.2	18.3		10.4	10.4
QSRatio											
95th Percentile Output:											
fB%	1.8	2.1	1.9				2.0	1.8		1.9	1.9
BOQ	22.0	0.0	17.2				4.9	20.4		11.8	11.8
QSRatio											
98th Percentile Output:											
fB%	2.1	2.7	2.2				2.5	2.1		2.3	2.3
BOQ	25.5	0.0	20.3				6.1	23.8		14.2	14.3
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 NB Ramps

Inter.: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
LGConfig				L		LT	R	L	T		T	R
Volume				501	3	325		483	817		1336	565
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru					Thru	A	A	A	
Right					Right				
Peds					Peds				
WB Left	A				SB Left				
Thru	A				Thru		A	A	
Right	A				Right		A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	21.3	0.0				15.2	8.2	9.7	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 70.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	539	1770	0.98	0.30	57.1	E		
LT	567	1863	0.01	0.30	17.0	B	44.9	D
R	482	1583	0.71	0.30	26.4	C		
Northbound								
L	384	1770	1.32	0.22	189.9	F		
T	2965	5074	0.29	0.58	7.3	A	75.1	E
Southbound								
T	1595	5074	0.88	0.31	28.9	C	59.0	E
R	498	1583	1.19	0.31	130.0	F		

Intersection Delay = 61.3 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 NB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				501	3	325	483	817			1336	565
% Heavy Veh				2	2	2	2	2			2	2
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
PK 15 Vol				132	1	86	127	215			352	149
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900	1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
LGConfig				L		LT	R	L		T			T	R
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0
Adj Flow				527	3	342	508	860			1406	595
%InSharedLn				0								
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000
Peds Bikes	0				0						0	
Buses				0	0	0	0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Arriv. Type				3	3	3	3	3			3	3
Unit Ext.				3.0	3.0	3.0	3.0	3.0			3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ext of g				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.3	0.0				15.2	8.2	9.7	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 70.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				501	3	325	483	817			1336	565
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
Adj flow				527	3	342	508	860			1406	595
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
Lane group				L	LT	R	L	T			T	R
Adj flow				527	3	342	508	860			1406	595
Prop LTs				0.000			0.000			0.000		
Prop RTs				0.000	1.000		0.000			0.000	1.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound	
LG				L	LT	R	L	T		T	R
So				1900	1900	1900	1900	1900		1900	1900
Lanes	0	0		1	1	1	1	3	0	3	1
fW				1.000	1.000	1.000	1.000	1.000		1.000	1.000
fHV				0.980	0.980	0.980	0.980	0.980		0.980	0.980
fG				1.000	1.000	1.000	1.000	1.000		1.000	1.000
fP				1.000	1.000	1.000	1.000	1.000		1.000	1.000
fBB				1.000	1.000	1.000	1.000	1.000		1.000	1.000
fA				1.000	1.000	1.000	1.000	1.000		1.000	1.000
fLU				1.000	1.000	1.000	1.000	0.908		0.908	1.000
fRT					1.000	0.850		1.000		1.000	0.850
fLT				0.950	1.000		0.950	1.000		1.000	
Sec.											
fLpb				1.000	1.000		1.000	1.000		1.000	
fRpb					1.000	1.000		1.000		1.000	1.000
S				1770	1863	1583	1770	5074		5074	1583
Sec.											

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	527	1770	#	0.30	0.30	539	0.98
Prot								
Perm								
Thru	LT	3	1863		0.00	0.30	567	0.01
Right	R	342	1583		0.22	0.30	482	0.71
Northbound								
Prot								
Perm								
Left	L	508	1770	#	0.29	0.22	384	1.32
Prot								
Perm								
Thru	T	860	5074		0.17	0.58	2965	0.29
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1406	5074		0.28	0.31	1595	0.88
Right	R	595	1583	#	0.38	0.31	498	1.19

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.96
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.15

Control Delay and LOS Determination

Appr/ Lane	Ratios	Unf Del	Prog Adj	Lane Grp	Incremental Factor	Del	Res Del	Lane Group	Approach

Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
Westbound												
L	0.98	0.30	24.1	1.000	539	0.48	33.0	0.0	57.1	E		
LT	0.01	0.30	17.0	1.000	567	0.11	0.0	0.0	17.0	B	44.9	D
R	0.71	0.30	21.6	1.000	482	0.27	4.8	0.0	26.4	C		
Northbound												
L	1.32	0.22	27.4	1.000	384	0.50	162.5	0.0	189.9	F		
T	0.29	0.58	7.3	1.000	2965	0.11	0.1	0.0	7.3	A	75.1	E
Southbound												
T	0.88	0.31	22.8	1.000	1595	0.41	6.1	0.0	28.9	C	59.0	E
R	1.19	0.31	24.0	1.000	498	0.50	106.0	0.0	130.0	F		

Intersection delay = 61.3 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 70.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 70.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000

Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 1.000 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

			EBLT	WBLT	NBLT	SBLT
Cycle length, C	70.0	sec				
Adj. LT vol from Vol Adjustment Worksheet, v						
v/c ratio from Capacity Worksheet, X						
Protected phase effective green interval, g (s)						
Opposing queue effective green interval, gq						
Unopposed green interval, gu						
Red time r=(C-g-gq-gu)						
Arrival rate, qa=v/(3600(max[X,1.0]))						
Protected ph. departure rate, Sp=s/3600						
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)						
XPerm						

XProt
Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	24.4	24.1	0.00	0.0	0.0	57.1
LT	0.0	0.00	24.4	17.0	0.00	0.0	0.0	17.0
R	0.0	0.00	24.4	21.6	0.00	0.0	0.0	26.4
Northbound								
L	0.0	0.00	27.4	27.4	0.00	31.0	0.0	189.9
T	0.0	0.00	14.6	7.3	0.00	0.0	0.0	7.3
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	24.0	22.8	0.00	0.0	0.0	28.9
R	0.0	0.00	24.0	24.0	0.00	24.3	0.0	130.0

Intersection Delay 61.3 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	LT	R	L	T		T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate				527	3	342	508	315		516	595	
So				1900	1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0	1	1	1	1	3	0	3	1	
SL				1770	1863	1583	1770	1862		1862	1583	
LnCapacity				539	567	482	384	1088		585	498	
Flow Ratio				0.3	0.0	0.2	0.3	0.2		0.3	0.4	
v/c Ratio				0.98	0.01	0.71	1.32	0.29		0.88	1.19	
Grn Ratio				0.30	0.30	0.30	0.22	0.58		0.31	0.31	
I Factor				1.000			1.000			1.000		
AT or PVG				3	3	3	3	3		3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Q1				10.1	0.0	5.9	9.9	3.1		9.5	11.6	
kB				0.4	0.4	0.4	0.3	0.6		0.4	0.4	
Q2				4.5	0.0	0.9	16.8	0.3		2.5	14.2	
Q Average				14.6	0.0	6.8	26.6	3.3		12.0	25.7	
Q Spacing				25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage				0	0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.2	1.2	1.2	1.2	1.2		1.2	1.2	
BOQ				17.1	0.1	8.0	30.7	4.0		14.1	29.7	
QSRatio												
85th Percentile Output:												
fB%				1.5	1.6	1.5	1.4	1.6		1.5	1.4	
BOQ				21.7	0.1	10.5	37.9	5.2		18.0	36.7	
QSRatio												
90th Percentile Output:												
fB%				1.6	1.8	1.7	1.5	1.7		1.6	1.5	
BOQ				23.3	0.1	11.4	40.1	5.8		19.5	38.9	
QSRatio												
95th Percentile Output:												
fB%				1.8	2.1	1.9	1.6	2.0		1.8	1.6	
BOQ				25.9	0.1	13.0	43.6	6.6		21.7	42.3	
QSRatio												
98th Percentile Output:												
fB%				2.0	2.7	2.3	1.8	2.5		2.1	1.8	
BOQ				29.6	0.1	15.6	48.7	8.2		25.2	47.3	
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 NB Ramps

Inter.: Redhill Ave at I-5 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	3	0	0	3	1
LGConfig				L		LT	R	L	T		T	R
Volume				387	47	496	456	1044			731	309
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	34.1	0.0				27.7	10.0	7.7 0.0
Yellow	3.2					3.2	3.6	3.6
All Red	0.5					0.5	0.5	0.5

Cycle Length: 95.1 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	635	1770	0.64	0.36	27.6	C		
LT	668	1863	0.07	0.36	20.1	C	38.9	D
R	568	1583	0.92	0.36	49.4	D		
Northbound								
L	516	1770	0.93	0.29	56.4	E		
T	2838	5074	0.39	0.56	11.9	B	25.4	C
Southbound								
T	1163	5074	0.66	0.23	34.7	C	42.0	D
R	363	1583	0.90	0.23	59.2	E		

Intersection Delay = 34.0 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Redhill Ave at I-5 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: I-5 NB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				387	47	496	456	1044			731	309
% Heavy Veh				2	2	2	2	2			2	2
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
PK 15 Vol				102	12	131	120	275			192	81
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900	1900	1900			1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
LGConfig				L		LT	R	L		T			T	R
Lane Width				12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol						0						0	
Adj Flow				407	49	522	480	1099			769	325
%InSharedLn				0								
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000
Peds Bikes	0				0						0	
Buses				0	0	0	0	0			0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0	0.0	0.0			0.0	0.0
Arriv. Type				3	3	3	3	3			3	3
Unit Ext.				3.0	3.0	3.0	3.0	3.0			3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ext of g				2.0	2.0	2.0	2.0	2.0			2.0	2.0
Ped Min g		3.2			3.2						3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	34.1	0.0				27.7	10.0	7.7	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 95.1 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				387	47	496	456	1044			731	309
PHF				0.95	0.95	0.95	0.95	0.95			0.95	0.95
Adj flow				407	49	522	480	1099			769	325
No. Lanes	0	0	0		1	1	1		1	3	0		0	3	1
Lane group				L		LT	R	L		T			T	R
Adj flow				407	49	522	480	1099			769	325
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000			0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	LT	R	L	T		T	R	
So				1900	1900	1900	1900	1900		1900	1900	
Lanes	0	0	0	1	1	1	1	3	0	3	1	
fW				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fHV				0.980	0.980	0.980	0.980	0.980		0.980	0.980	
fG				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fP				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fBB				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fA				1.000	1.000	1.000	1.000	1.000		1.000	1.000	
fLU				1.000	1.000	1.000	1.000	0.908		0.908	1.000	
fRT					1.000	0.850		1.000		1.000	0.850	
fLT				0.950	1.000		0.950	1.000		1.000		
Sec.												
fLpb				1.000	1.000		1.000	1.000		1.000		
fRpb					1.000	1.000		1.000		1.000	1.000	
S				1770	1863	1583	1770	5074		5074	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	407	1770		0.23	0.36	635	0.64
Prot								
Perm								
Thru	LT	49	1863		0.03	0.36	668	0.07
Right	R	522	1583	#	0.33	0.36	568	0.92
Northbound								
Prot								
Perm								
Left	L	480	1770	#	0.27	0.29	516	0.93
Prot								
Perm								
Thru	T	1099	5074		0.22	0.56	2838	0.39
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	769	5074		0.15	0.23	1163	0.66
Right	R	325	1583	#	0.21	0.23	363	0.90

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.81
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.92

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.64	0.36	25.4	1.000	635	0.22	2.2	0.0	27.6	C		
LT	0.07	0.36	20.1	1.000	668	0.11	0.0	0.0	20.1	C	38.9	D
R	0.92	0.36	29.2	1.000	568	0.44	20.2	0.0	49.4	D		
Northbound												
L	0.93	0.29	32.8	1.000	516	0.45	23.6	0.0	56.4	E		
T	0.39	0.56	11.8	1.000	2838	0.11	0.1	0.0	11.9	B	25.4	C
Southbound												

T	0.66	0.23	33.3	1.000	1163	0.24	1.4	0.0	34.7	C	42.0	D
R	0.90	0.23	35.5	1.000	363	0.42	23.6	0.0	59.2	E		

Intersection delay = 34.0 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.1 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.1 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.1 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	30.5	25.4	0.00	0.0	0.0	27.6
LT	0.0	0.00	30.5	20.1	0.00	0.0	0.0	20.1
R	0.0	0.00	30.5	29.2	0.00	0.0	0.0	49.4
Northbound								
L	0.0	0.00	33.7	32.8	0.00	0.0	0.0	56.4
T	0.0	0.00	20.9	11.8	0.00	0.0	0.0	11.9
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	36.6	33.3	0.00	0.0	0.0	34.7
R	0.0	0.00	36.6	35.5	0.00	0.0	0.0	59.2

Intersection Delay 34.0 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L	LT	R	L	T		T	R	
Init Queue				0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate				407	49	522	480	403		282	325	
So				1900	1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0	1	1	1	1	3	0	3	1	
SL				1770	1863	1583	1770	1862		1862	1583	
LnCapacity				635	668	568	516	1041		426	363	
Flow Ratio				0.2	0.0	0.3	0.3	0.2		0.2	0.2	
v/c Ratio				0.64	0.07	0.92	0.93	0.39		0.66	0.90	
Grn Ratio				0.36	0.36	0.36	0.29	0.56		0.23	0.23	
I Factor					1.000			1.000		1.000		
AT or PVG				3	3	3	3	3		3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Q1				9.0	0.9	13.2	12.3	6.0		6.8	8.3	
kB				0.5	0.6	0.5	0.5	0.7		0.4	0.4	
Q2				0.9	0.0	3.6	3.6	0.5		0.8	2.3	
Q Average				9.9	0.9	16.8	15.9	6.4		7.6	10.6	
Q Spacing				25.0	25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage				0	0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%				1.2	1.2	1.2	1.2	1.2		1.2	1.2	
BOQ				11.7	1.1	19.5	18.5	7.6		9.0	12.4	
QSRatio												
85th Percentile Output:												
fB%				1.5	1.6	1.5	1.5	1.5		1.5	1.5	
BOQ				15.0	1.4	24.7	23.5	9.9		11.6	16.0	
QSRatio												
90th Percentile Output:												
fB%				1.6	1.8	1.6	1.6	1.7		1.7	1.6	
BOQ				16.3	1.6	26.4	25.1	10.9		12.7	17.3	
QSRatio												
95th Percentile Output:												
fB%				1.8	2.1	1.7	1.7	1.9		1.9	1.8	
BOQ				18.3	1.9	29.1	27.8	12.4		14.3	19.4	
QSRatio												
98th Percentile Output:												
fB%				2.2	2.6	2.0	2.0	2.3		2.3	2.1	
BOQ				21.4	2.4	33.1	31.7	14.9		17.1	22.7	
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 SB Ramps

Inter.: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
LGConfig		LT	R					T	R	L	T	
Volume	246	0	433					1066	587	499	1319	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru		A	A	
Right	A				Right		A	A	
Peds					Peds				
WB Left					SB Left	A			
Thru					Thru	A	A	A	
Right					Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	23.5	0.0				25.2	14.6	16.1	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	439	1774	0.59	0.25	33.6	C	97.5	F
R	392	1583	1.16	0.25	133.7	F		
Westbound								
Northbound								
T	2478	6765	0.45	0.37	23.0	C	45.4	D
R	580	1583	1.07	0.37	86.1	F		
Southbound								
L	470	1770	1.12	0.27	112.4	F		
T	4536	6765	0.31	0.67	6.5	A	35.6	D

Intersection Delay = 49.6 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 SB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	246	0	433					1066	587	499	1319	
% Heavy Veh	2	2	2					2	2	2	2	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
PK 15 Vol	65	0	114					281	154	131	347	
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat		1900	1900					1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
LGConfig		LT	R					T	R	L	T	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			
Adj Flow		259	456					1122	618	525	1388	
%InSharedLn												
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	
Peds Bikes	0			0			0					
Buses		0	0					0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0					0.0	0.0	0.0	0.0	
Arriv. Type		3	3					3	3	3	3	
Unit Ext.		3.0	3.0					3.0	3.0	3.0	3.0	
I Factor		1.000						1.000			1.000	
Lost Time		2.0	2.0					2.0	2.0	2.0	2.0	
Ext of g		2.0	2.0					2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	23.5	0.0				25.2	14.6	16.1	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R

| | | |

Northbound

T	0.45	0.37	22.9	1.000	2478	0.11	0.1	0.0	23.0	C	45.4	D
R	1.07	0.37	30.1	1.000	580	0.50	56.0	0.0	86.1	F		
Southbound												
L	1.12	0.27	34.9	1.000	470	0.50	77.5	0.0	112.4	F		
T	0.31	0.67	6.5	1.000	4536	0.11	0.0	0.0	6.5	A	35.6	D

Intersection delay = 49.6 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		1.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo			1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					

gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
LT	0.0	0.00	35.8	31.5	0.00	0.0	0.0	33.6
R	0.0	0.00	35.8	35.8	0.00	16.0	0.0	133.7
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	30.1	22.9	0.00	0.0	0.0	23.0
R	0.0	0.00	30.1	30.1	0.00	9.5	0.0	86.1
Southbound								
L	0.0	0.00	34.9	34.9	0.00	13.8	0.0	112.4
T	0.0	0.00	15.7	6.5	0.00	0.0	0.0	6.5
	0.0						0.0	

Intersection Delay 49.6 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

LaneGroup	Eastbound LT	Eastbound R	Westbound	Northbound T	Northbound R	Southbound L	Southbound T
Init Queue	0.0	0.0		0.0	0.0	0.0	0.0
Flow Rate	259	456		308	618	525	382
So	1900	1900		1900	1900	1900	1900
No.Lanes	1	1	0 0 0	4	1	1	4 0
SL	1774	1583		1862	1583	1770	1862
LnCapacity	439	392		682	580	470	1248
Flow Ratio	0.1	0.3		0.2	0.4	0.3	0.2
v/c Ratio	0.59	1.16		0.45	1.07	1.12	0.31
Grn Ratio	0.25	0.25		0.37	0.37	0.27	0.67
I Factor	1.000			1.000			1.000
AT or PVG	3	3		3	3	3	3
Pltn Ratio	1.00	1.00		1.00	1.00	1.00	1.00
PF2	1.00	1.00		1.00	1.00	1.00	1.00
Q1	6.0	12.0		6.2	16.3	13.9	4.2
kB	0.4	0.4		0.6	0.5	0.5	0.8
Q2	0.6	10.3		0.5	9.1	9.9	0.4
Q Average	6.6	22.3		6.6	25.4	23.7	4.5
Q Spacing	25.0	25.0		25.0	25.0	25.0	25.0
Q Storage	0	0		0	0	0	0
Q S Ratio							
70th Percentile Output:							
fB%	1.2	1.2		1.2	1.2	1.2	1.2
BOQ	7.9	25.8		7.9	29.3	27.4	5.4
QSRatio							
85th Percentile Output:							
fB%	1.5	1.4		1.5	1.4	1.4	1.6
BOQ	10.2	32.2		10.2	36.3	34.1	7.1
QSRatio							
90th Percentile Output:							
fB%	1.7	1.5		1.7	1.5	1.5	1.7
BOQ	11.2	34.1		11.2	38.4	36.1	7.8
QSRatio							
95th Percentile Output:							
fB%	1.9	1.7		1.9	1.6	1.7	2.0
BOQ	12.7	37.3		12.7	41.8	39.4	8.9
QSRatio							
98th Percentile Output:							
fB%	2.3	1.9		2.3	1.8	1.9	2.4
BOQ	15.3	41.9		15.3	46.8	44.2	10.9
QSRatio							

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 SB Ramps

Inter.: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Redhill Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
LGConfig		LT	R					T	R	L	T	
Volume	408	0	332					1092	523	367	738	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru		A	A	
Right	A				Right		A	A	
Peds					Peds				
WB Left					SB Left	A			
Thru					Thru	A	A	A	
Right					Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	21.0	0.0				18.0	6.1	19.3	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	466	1774	0.92	0.26	52.3	D	47.7	D
R	416	1583	0.84	0.26	42.0	D		
Westbound								
Northbound								
T	2495	6765	0.46	0.37	19.3	B	28.8	C
R	584	1583	0.94	0.37	48.5	D		
Southbound								
L	398	1770	0.97	0.23	67.8	E		
T	4330	6765	0.18	0.64	5.9	A	26.4	C

Intersection Delay = 32.1 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Redhill Ave at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 SB Ramps N/S St: Redhill Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	408	0	332					1092	523	367	738	
% Heavy Veh	2	2	2					2	2	2	2	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
PK 15 Vol	107	0	87					287	138	97	194	
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat		1900	1900					1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
LGConfig		LT	R					T	R	L	T	
Lane Width		12.0	12.0					12.0	12.0	12.0	12.0	
RTOR Vol			0						0			
Adj Flow		429	349					1149	551	386	777	
%InSharedLn												
Prop LTs		1.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	
Peds Bikes		0			0			0				
Buses		0	0					0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0					0.0	0.0	0.0	0.0	
Arriv. Type		3	3					3	3	3	3	
Unit Ext.		3.0	3.0					3.0	3.0	3.0	3.0	
I Factor		1.000						1.000			1.000	
Lost Time		2.0	2.0					2.0	2.0	2.0	2.0	
Ext of g		2.0	2.0					2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru		A	A
Right	A				Right		A	A
Peds					Peds			
WB Left					SB Left	A		
Thru					Thru	A	A	A
Right					Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.0	0.0				18.0	6.1	19.3	0.0
Yellow	3.2					3.2	3.6	3.6	
All Red	0.5					0.5	0.5	0.5	

Cycle Length: 80.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	408	0	332					1092	523	367	738	
PHF	0.95	0.95	0.95					0.95	0.95	0.95	0.95	
Adj flow	429	0	349					1149	551	386	777	
No. Lanes	0	1	1	0	0	0	0	4	1	1	4	0
Lane group		LT	R					T	R	L	T	
Adj flow		429	349					1149	551	386	777	
Prop LTs		1.000						0.000			0.000	
Prop RTs	0.000	1.000					0.000	1.000		0.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound						Westbound						Northbound			Southbound	
LG		LT	R										T	R	L	T	
So		1900	1900										1900	1900	1900	1900	
Lanes	0	1	1	0	0	0	0	0					4	1	1	4	0
fW		1.000	1.000										1.000	1.000	1.000	1.000	
fHV		0.980	0.980										0.980	0.980	0.980	0.980	
fG		1.000	1.000										1.000	1.000	1.000	1.000	
fP		1.000	1.000										1.000	1.000	1.000	1.000	
fBB		1.000	1.000										1.000	1.000	1.000	1.000	
fA		1.000	1.000										1.000	1.000	1.000	1.000	
fLU		1.000	1.000										0.908	1.000	1.000	0.908	
fRT		1.000	0.850										1.000	0.850		1.000	
fLT		0.952											1.000		0.950	1.000	
Sec.																	
fLpb		1.000											1.000		1.000	1.000	
fRpb		1.000	1.000										1.000	1.000		1.000	
S		1774	1583										6765	1583	1770	6765	
Sec.																	

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	429	1774	#	0.24	0.26	466	0.92
Right	R	349	1583		0.22	0.26	416	0.84
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1149	6765		0.17	0.37	2495	0.46
Right	R	551	1583	#	0.35	0.37	584	0.94
Southbound								
Prot								
Perm								
Left	L	386	1770	#	0.22	0.23	398	0.97
Prot								
Perm								
Thru	T	777	6765		0.11	0.64	4330	0.18
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.81
Total lost time per cycle, L = 11.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.94

Control Delay and LOS Determination

Appr/	Ratios	Unf	Prog	Lane	Incremental	Res	Lane Group	Approach

Lane Grp	v/c	g/C	Del d1	Adj Fact	Grp Cap	Factor k	Del d2	Del d3	Delay	LOS	Delay	LOS
Eastbound												
LT	0.92	0.26	28.7	1.000	466	0.44	23.6	0.0	52.3	D	47.7	D
R	0.84	0.26	27.9	1.000	416	0.37	14.1	0.0	42.0	D		
Westbound												
Northbound												
T	0.46	0.37	19.2	1.000	2495	0.11	0.1	0.0	19.3	B	28.8	C
R	0.94	0.37	24.4	1.000	584	0.46	24.1	0.0	48.5	D		
Southbound												
L	0.97	0.23	30.7	1.000	398	0.48	37.1	0.0	67.8	E		
T	0.18	0.64	5.9	1.000	4330	0.11	0.0	0.0	5.9	A	26.4	C

Intersection delay = 32.1 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 80.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				

Proportion of LT in LT lane group, PLT 1.000 0.000 0.000
Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 1.000 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	80.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					

XPerm
XProt
Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
LT	0.0	0.00	29.5	28.7	0.00	0.0	0.0	52.3
R	0.0	0.00	29.5	27.9	0.00	0.0	0.0	42.0
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	25.2	19.2	0.00	0.0	0.0	19.3
R	0.0	0.00	25.2	24.4	0.00	0.0	0.0	48.5
Southbound								
L	0.0	0.00	31.0	30.7	0.00	0.0	0.0	67.8
T	0.0	0.00	14.4	5.9	0.00	0.0	0.0	5.9
	0.0						0.0	

Intersection Delay 32.1 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound		Southbound		
LaneGroup	LT	R				T	R	L	T	
Init Queue	0.0	0.0				0.0	0.0	0.0	0.0	
Flow Rate	429	349				316	551	386	213	
So	1900	1900				1900	1900	1900	1900	
No.Lanes	1	1	0	0	0	4	1	1	4	0
SL	1774	1583				1862	1583	1770	1862	
LnCapacity	466	416				686	584	398	1192	
Flow Ratio	0.2	0.2				0.2	0.3	0.2	0.1	
v/c Ratio	0.92	0.84				0.46	0.94	0.97	0.18	
Grn Ratio	0.26	0.26				0.37	0.37	0.23	0.64	
I Factor	1.000					1.000			1.000	
AT or PVG	3	3				3	3	3	3	
Pltn Ratio	1.00	1.00				1.00	1.00	1.00	1.00	
PF2	1.00	1.00				1.00	1.00	1.00	1.00	
Q1	9.3	7.3				5.3	11.9	8.5	1.9	
kB	0.4	0.4				0.5	0.5	0.4	0.7	
Q2	2.9	1.7				0.4	4.0	3.5	0.2	
Q Average	12.2	9.0				5.8	15.8	12.0	2.1	
Q Spacing	25.0	25.0				25.0	25.0	25.0	25.0	
Q Storage	0	0				0	0	0	0	
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2				1.2	1.2	1.2	1.2	
BOQ	14.3	10.6				6.9	18.5	14.1	2.5	
QSRatio										
85th Percentile Output:										
fB%	1.5	1.5				1.5	1.5	1.5	1.6	
BOQ	18.3	13.7				8.9	23.4	18.1	3.3	
QSRatio										
90th Percentile Output:										
fB%	1.6	1.7				1.7	1.6	1.6	1.8	
BOQ	19.7	14.9				9.8	25.0	19.5	3.7	
QSRatio										
95th Percentile Output:										
fB%	1.8	1.9				1.9	1.7	1.8	2.0	
BOQ	22.0	16.8				11.2	27.7	21.8	4.2	
QSRatio										
98th Percentile Output:										
fB%	2.1	2.2				2.3	2.0	2.1	2.6	
BOQ	25.5	19.8				13.5	31.6	25.2	5.3	
QSRatio										

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 SB Ramps

Inter.: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Newport Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Volume	280	62	434	70		151		1099	85	173	1787	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		A			NB Left				
Thru		A			Thru		A	A	
Right	A	A			Right		A	A	
Peds					Peds				
WB Left	A				SB Left	A			
Thru					Thru	A	A	A	
Right	A				Right				
Peds					Peds				
NB Right					EB Right	A	A	A	
SB Right					WB Right				
Green	7.3	11.9	0.0			8.4	8.2	6.0	0.0
Yellow	3.6	3.6				3.2	3.9	3.9	
All Red	1.0	1.0				1.0	1.0	1.0	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	324	1770	0.91	0.18	54.5	D		
LT	341	1863	0.19	0.18	22.7	C	21.5	C
R	1583	1583	0.29	1.00	0.1	A		
Westbound								
L	199	1770	0.37	0.11	27.9	C		
							54.9	D
R	178	1583	0.89	0.11	67.4	E		
Northbound								
TR	1475	5020	0.84	0.29	26.3	C	26.3	C
Southbound								
L	229	1770	0.79	0.13	44.9	D		
T	2475	5074	0.76	0.49	15.0	B	17.6	B

Intersection Delay = 22.8 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Newport Ave at I-5 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: I-5 SB Ramps N/S St: Newport Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	280	62	434	70		151		1099	85	173	1787	
% Heavy Veh	2	2	2	2		2		2	2	2	2	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol	74	16	114	18		40		289	22	46	470	
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900	1900	1900		1900		1900		1900	1900	
ParkExist												
NumPark												
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol			0			0			0			
Adj Flow	295	65	457	74		159		1246		182	1881	
%InSharedLn	0											
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.071			0.000	
Peds Bikes	0			0			0					
Buses	0	0	0	0		0		0		0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Arriv. Type	3	3	3	3		3		3		3	3	
Unit Ext.	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru	A	A	
Right	A	A			Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right	A	A	A
SB Right					WB Right			
Green	7.3	11.9	0.0		8.4	8.2	6.0	0.0
Yellow	3.6	3.6			3.2	3.9	3.9	
All Red	1.0	1.0			1.0	1.0	1.0	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	280	62	434	70		151		1099	85	173	1787	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow	295	65	457	74		159		1157	89	182	1881	
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
Lane group	L	LT	R	L		R		TR		L	T	
Adj flow	295	65	457	74		159		1246		182	1881	
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.071			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LT	R	L		R	TR			L	T	
So	1900	1900	1900	1900		1900	1900			1900	1900	
Lanes	1	1	1	1	0	1	0	3	0	1	3	0
fW	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fHV	0.980	0.980	0.980	0.980		0.980		0.980		0.980	0.980	
fG	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fP	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fBB	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fA	1.000	1.000	1.000	1.000		1.000		1.000		1.000	1.000	
fLU	1.000	1.000	1.000	1.000		1.000		0.908		1.000	0.908	
fRT		1.000	0.850			0.850		0.989			1.000	
fLT	0.950	1.000		0.950				1.000		0.950	1.000	
Sec.												
fLpb	1.000	1.000		1.000				1.000		1.000	1.000	
fRpb		1.000	1.000			1.000		1.000			1.000	
S	1770	1863	1583	1770		1583		5020		1770	5074	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	295	1770	#	0.17	0.18	324	0.91
Prot								
Perm								
Thru	LT	65	1863		0.03	0.18	341	0.19
Right	R	457	1583		0.29	1.00	1583	0.29
Westbound								
Prot								
Perm								
Left	L	74	1770		0.04	0.11	199	0.37
Prot								
Perm								
Thru								
Right	R	159	1583	#	0.10	0.11	178	0.89
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1246	5020		0.25	0.29	1475	0.84
Right								
Southbound								
Prot								
Perm								
Left	L	182	1770		0.10	0.13	229	0.79
Prot								
Perm								
Thru	T	1881	5074	#	0.37	0.49	2475	0.76
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.64
Total lost time per cycle, L = 14.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.81

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.91	0.18	26.0	1.000	324	0.43	28.5	0.0	54.5	D		
LT	0.19	0.18	22.5	1.000	341	0.11	0.3	0.0	22.7	C	21.5	C
R	0.29	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Westbound												
L	0.37	0.11	26.7	1.000	199	0.11	1.2	0.0	27.9	C		
											54.9	D
R	0.89	0.11	28.5	1.000	178	0.42	38.9	0.0	67.4	E		
Northbound												
TR	0.84	0.29	21.6	1.000	1475	0.38	4.7	0.0	26.3	C	26.3	C
Southbound												
L	0.79	0.13	27.5	1.000	229	0.34	17.4	0.0	44.9	D		

T	0.76	0.49	13.6	1.000	2475	0.31	1.4	0.0	15.0	B	17.6	B

Intersection delay = 22.8 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	26.5	26.0	0.00	0.0	0.0	54.5

LT	0.0	0.00	26.5	22.5	0.00	0.0	0.0	22.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Westbound								
L	0.0	0.00	28.9	26.7	0.00	0.0	0.0	27.9
	0.0						0.0	
R	0.0	0.00	28.9	28.5	0.00	0.0	0.0	67.4
Northbound								
	0.0						0.0	
TR	0.0	0.00	22.9	21.6	0.00	0.0	0.0	26.3
	0.0						0.0	
Southbound								
L	0.0	0.00	28.3	27.5	0.00	0.0	0.0	44.9
T	0.0	0.00	16.6	13.6	0.00	0.0	0.0	15.0
	0.0						0.0	

Intersection Delay 22.8 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound	Southbound	
LaneGroup	L	LT	R	L	R	TR	L	T
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate	295	65	457	74	159	457	182	690
So	1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	1	1	1	1 0	1	0 3 0	1	3 0
SL	1770	1863	1583	1770	1583	1842	1770	1862
LnCapacity	324	341	1583	199	178	541	229	908
Flow Ratio	0.2	0.0	0.3	0.0	0.1	0.2	0.1	0.4
v/c Ratio	0.91	0.19	0.29	0.37	0.89	0.84	0.79	0.76
Grn Ratio	0.18	0.18	1.00	0.11	0.11	0.29	0.13	0.49
I Factor		1.000		1.000		1.000		1.000
AT or PVG	3	3	3	3	3	3	3	3
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1	5.2	1.0		1.2	2.8	7.8	3.2	10.1
kB	0.3	0.3	0.7	0.2	0.2	0.4	0.2	0.5
Q2	1.9	0.1	0.3	0.1	1.1	1.8	0.8	1.6
Q Average	7.1	1.1		1.4	4.0	9.6	4.0	11.7
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage	0	0	0	0	0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2		1.2	1.2	1.2	1.2	1.2
BOQ	8.5	1.3		1.6	4.7	11.3	4.7	13.8
QSRatio								
85th Percentile Output:								
fB%	1.5	1.6		1.6	1.6	1.5	1.6	1.5
BOQ	11.0	1.7		2.2	6.2	14.5	6.2	17.6
QSRatio								
90th Percentile Output:								
fB%	1.7	1.8		1.8	1.7	1.6	1.7	1.6
BOQ	12.0	1.9		2.4	6.9	15.8	6.9	19.0
QSRatio								
95th Percentile Output:								
fB%	1.9	2.1		2.1	2.0	1.9	2.0	1.8
BOQ	13.6	2.2		2.8	7.9	17.7	7.9	21.3
QSRatio								
98th Percentile Output:								
fB%	2.3	2.6		2.6	2.4	2.2	2.4	2.1
BOQ	16.3	2.8		3.5	9.7	20.9	9.7	24.7
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 SB Ramps

Inter.: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Newport Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Volume	370	49	582	78		173		1838	97	247	1147	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left		A			NB Left				
Thru		A			Thru		A	A	
Right	A	A			Right		A	A	
Peds					Peds				
WB Left	A				SB Left	A			
Thru					Thru	A	A	A	
Right	A				Right				
Peds					Peds				
NB Right					EB Right	A	A	A	
SB Right					WB Right				
Green	11.8	22.2	0.0			16.4	26.4	20.0	0.0
Yellow	3.6	3.6				3.2	3.9	3.9	
All Red	1.0	1.0				1.0	1.0	1.0	

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	327	1770	1.19	0.19	160.6	F		
LT	345	1863	0.15	0.19	41.2	D	61.4	E
R	1583	1583	0.39	1.00	0.2	A		
Westbound								
L	174	1770	0.47	0.10	53.2	D		
							139.2	F
R	156	1583	1.17	0.10	178.0	F		
Northbound								
TR	2153	5036	0.95	0.43	42.6	D	42.6	D
Southbound								
L	242	1770	1.07	0.14	130.8	F		
T	3040	5074	0.40	0.60	12.7	B	33.7	C

Intersection Delay = 49.3 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff

Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Newport Ave at I-5 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-5 SB Ramps N/S St: Newport Ave

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	370	49	582	78		173		1838	97	247	1147	
% Heavy Veh	2	2	2	2		2		2	2	2	2	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol	97	13	153	21		46		484	26	65	302	
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900	1900	1900		1900		1900		1900	1900	
ParkExist												
NumPark												
No. Lanes	1	1	1	1	0	1	0	3	0	1	3	0
LGConfig	L	LT	R	L		R		TR		L	T	
Lane Width	12.0	12.0	12.0	12.0		12.0		12.0		12.0	12.0	
RTOR Vol			0			0			0			
Adj Flow	389	52	613	82		182		2037		260	1207	
%InSharedLn	0											
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000			1.000		0.050			0.000	
Peds Bikes	0			0			0					
Buses	0	0	0	0		0		0		0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0	0.0		0.0		0.0		0.0	0.0	
Arriv. Type	3	3	3	3		3		3		3	3	
Unit Ext.	3.0	3.0	3.0	3.0		3.0		3.0		3.0	3.0	
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0		2.0		2.0		2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left		A			NB Left			
Thru		A			Thru		A	A
Right	A	A			Right		A	A
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right	A	A	A
SB Right					WB Right			
Green	11.8	22.2	0.0			16.4	26.4	20.0	0.0
Yellow	3.6	3.6				3.2	3.9	3.9	
All Red	1.0	1.0				1.0	1.0	1.0	

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	370	49	582	78		173		1838	97	247	1147	
PHF	0.95	0.95	0.95	0.95		0.95		0.95	0.95	0.95	0.95	

| | | |

R	1.17	0.10	54.1	1.000	156	0.50	123.9	0.0	178.0	F		
Northbound												
TR	0.95	0.43	33.0	1.000	2153	0.46	9.6	0.0	42.6	D	42.6	D
Southbound												
L	1.07	0.14	51.8	1.000	242	0.50	79.0	0.0	130.8	F		
T	0.40	0.60	12.6	1.000	3040	0.11	0.1	0.0	12.7	B	33.7	C

Intersection delay = 49.3 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				

Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 120.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	48.9	48.9	0.00	15.5	0.0	160.6
LT	0.0	0.00	48.9	41.0	0.00	0.0	0.0	41.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
L	0.0	0.00	54.1	51.2	0.00	0.0	0.0	53.2
	0.0						0.0	
R	0.0	0.00	54.1	54.1	0.00	6.5	0.0	178.0
Northbound								
	0.0						0.0	
TR	0.0	0.00	34.4	33.0	0.00	0.0	0.0	42.6
	0.0						0.0	
Southbound								
L	0.0	0.00	51.8	51.8	0.00	4.5	0.0	130.8
T	0.0	0.00	24.0	12.6	0.00	0.0	0.0	12.7
	0.0						0.0	

Intersection Delay 49.3 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound	Southbound	
LaneGroup	L	LT	R	L	R	TR	L	T
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate	389	52	613	82	182	747	260	443
So	1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	1	1	1	1 0	1	0 3 0	1	3 0
SL	1770	1863	1583	1770	1583	1848	1770	1862
LnCapacity	327	345	1583	174	156	790	242	1116
Flow Ratio	0.2	0.0	0.4	0.0	0.1	0.4	0.1	0.2
v/c Ratio	1.19	0.15	0.39	0.47	1.17	0.95	1.07	0.40
Grn Ratio	0.19	0.19	1.00	0.10	0.10	0.43	0.14	0.60
I Factor		1.000		1.000		1.000		1.000
AT or PVG	3	3	3	3	3	3	3	3
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1	13.0	1.5		2.6	6.1	23.9	8.7	7.8
kB	0.4	0.4	1.1	0.3	0.3	0.7	0.3	0.9
Q2	9.8	0.1	0.7	0.3	4.6	5.9	4.7	0.6
Q Average	22.8	1.5		2.8	10.6	29.8	13.3	8.3
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage	0	0	0	0	0	0	0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2		1.2	1.2	1.1	1.2	1.2
BOQ	26.4	1.8		3.4	12.5	34.2	15.6	9.8
QSRatio								
85th Percentile Output:								
fB%	1.4	1.6		1.6	1.5	1.4	1.5	1.5
BOQ	32.8	2.4		4.5	16.1	42.1	19.9	12.7
QSRatio								
90th Percentile Output:								
fB%	1.5	1.8		1.7	1.6	1.5	1.6	1.7
BOQ	34.8	2.7		5.0	17.4	44.4	21.4	13.9
QSRatio								
95th Percentile Output:								
fB%	1.7	2.1		2.0	1.8	1.6	1.8	1.9
BOQ	38.0	3.1		5.7	19.5	48.1	23.8	15.7
QSRatio								
98th Percentile Output:								
fB%	1.9	2.6		2.5	2.1	1.8	2.1	2.2
BOQ	42.7	4.0		7.1	22.8	53.7	27.5	18.6
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 NB Ramps

Inter.: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Volume				848		522		808	560		1282	930
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right	A	A		
Peds					Peds				
NB Right		A			EB Right				
SB Right		A			WB Right				
Green		24.5	0.0			4.3	9.5	0.0	
Yellow		4.3				4.3	3.6		
All Red		3.5				3.5	2.5		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1403	3437	0.64	0.41	15.2	B		
							19.5	B
R	646	1583	0.85	0.41	26.5	C		
Northbound								
T	1827	5074	0.47	0.36	15.0	B	8.9	A
R	1583	1583	0.37	1.00	0.1	A		
Southbound								
T	1827	5074	0.74	0.36	18.4	B	11.0	B
R	1583	1583	0.62	1.00	0.7	A		

Intersection Delay = 12.7 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 NB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				848		522		808	560		1282	930
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				223		137		213	147		337	245
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	0	1	0	3	1	0	3	1
LGConfig				L			R		T	R		T	R
Lane Width				12.0			12.0		12.0	12.0		12.0	12.0
RTOR Vol							0			0			0
Adj Flow				893			549		851	589		1349	979
%InSharedLn													
Prop LTs									0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000	
Peds Bikes	0				0			0			0		
Buses				0		0			0	0		0	0
%InProtPhase													

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		24.5	0.0			4.3	9.5	0.0
Yellow		4.3				4.3	3.6	
All Red		3.5				3.5	2.5	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				848		522		808	560		1282	930
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				893		549		851	589		1349	979
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
Lane group				L		R		T	R		T	R
Adj flow				893		549		851	589		1349	979
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R		T	R		T	R
So				1900		1900		1900	1900		1900	1900
Lanes	0	0	0	2	0	1	0	3	1	0	3	1
fW				1.000		1.000		1.000	1.000		1.000	1.000
fHV				0.980		0.980		0.980	0.980		0.980	0.980
fG				1.000		1.000		1.000	1.000		1.000	1.000
fP				1.000		1.000		1.000	1.000		1.000	1.000
fBB				1.000		1.000		1.000	1.000		1.000	1.000
fA				1.000		1.000		1.000	1.000		1.000	1.000
fLU				0.971		1.000		0.908	1.000		0.908	1.000
fRT						0.850		1.000	0.850		1.000	0.850
fLT				0.950				1.000			1.000	
Sec.												
fLpb				1.000				1.000			1.000	
fRpb						1.000		1.000	1.000		1.000	1.000
S				3437		1583		5074	1583		5074	1583
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Westbound							
Prot							
Perm							
Left	L	893	3437	0.26	0.41	1403	0.64
Prot							
Perm							
Thru							
Right	R	549	1583	0.35	0.41	646	0.85
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	851	5074	0.17	0.36	1827	0.47
Right	R	589	1583	0.37	1.00	1583	0.37
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1349	5074	0.27	0.36	1827	0.74
Right	R	979	1583	# 0.62	1.00	1583	0.62

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.62
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.62

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS

Eastbound												
Westbound												
L	0.64	0.41	14.2	1.000	1403	0.22	1.0	0.0	15.2	B		
											19.5	B
R	0.85	0.41	16.1	1.000	646	0.38	10.5	0.0	26.5	C		
Northbound												
T	0.47	0.36	14.8	1.000	1827	0.11	0.2	0.0	15.0	B	8.9	A
R	0.37	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												
T	0.74	0.36	16.7	1.000	1827	0.30	1.6	0.0	18.4	B	11.0	B
R	0.62	1.00	0.0	0.950	1583	0.20	0.7	0.0	0.7	A		

Intersection delay = 12.7 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)				
or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				

Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				

Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	17.7	14.2	0.00	0.0	0.0	15.2
	0.0						0.0	
R	0.0	0.00	17.7	16.1	0.00	0.0	0.0	26.5
Northbound								
	0.0						0.0	
T	0.0	0.00	19.2	14.8	0.00	0.0	0.0	15.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	19.2	16.7	0.00	0.0	0.0	18.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.7

Intersection Delay 12.7 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound		
LaneGroup				L		R		T	R		T	R
Init Queue				0.0		0.0		0.0	0.0		0.0	0.0
Flow Rate				459		549		312	589		495	979
So				1900		1900		1900	1900		1900	1900
No.Lanes	0	0	0	2	0	1	0	3	1	0	3	1
SL				1770		1583		1862	1583		1862	1583
LnCapacity				722		646		670	1583		670	1583
Flow Ratio				0.3		0.3		0.2	0.4		0.3	0.6
v/c Ratio				0.64		0.85		0.47	0.37		0.74	0.62
Grn Ratio				0.41		0.41		0.36	1.00		0.36	1.00
I Factor				1.000				1.000			1.000	
AT or PVG				3		3		3	3		3	3
Pltn Ratio				1.00		1.00		1.00	1.00		1.00	1.00
PF2				1.00		1.00		1.00			1.00	
Q1				6.1		8.3		4.0			7.2	
kB				0.4		0.4		0.4	0.7		0.4	0.7
Q2				0.8		2.0		0.4	0.4		1.1	1.1
Q Average				6.9		10.3		4.4			8.3	
Q Spacing				25.0		25.0		25.0	25.0		25.0	25.0
Q Storage				0		0		0	0		0	0
Q S Ratio												
70th Percentile Output:												
fB%				1.2		1.2		1.2			1.2	
BOQ				8.1		12.1		5.2			9.8	
QSRatio												
85th Percentile Output:												
fB%				1.5		1.5		1.6			1.5	
BOQ				10.6		15.6		6.8			12.7	
QSRatio												
90th Percentile Output:												
fB%				1.7		1.6		1.7			1.7	
BOQ				11.6		16.9		7.5			13.9	
QSRatio												
95th Percentile Output:												
fB%				1.9		1.8		2.0			1.9	
BOQ				13.1		19.0		8.6			15.7	
QSRatio												
98th Percentile Output:												
fB%				2.3		2.2		2.4			2.2	
BOQ				15.7		22.2		10.5			18.6	
QSRatio												

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 NB Ramps

Inter.: Culver at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Volume				493		822		1978	400		1247	660
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left		A			SB Left				
Thru					Thru	A	A		
Right		A			Right	A	A		
Peds					Peds				
NB Right		A			EB Right				
SB Right		A			WB Right				
Green		52.1	0.0			8.8	32.4	0.0	
Yellow		4.3				4.3	3.6		
All Red		3.5				3.5	2.5		

Cycle Length: 115.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1557	3437	0.33	0.45	20.4	C		
							93.4	F
R	717	1583	1.21	0.45	137.2	F		
Northbound								
T	2162	5074	0.96	0.43	44.0	D	36.6	D
R	1583	1583	0.27	1.00	0.1	A		
Southbound								
T	2162	5074	0.61	0.43	26.0	C	17.1	B
R	1583	1583	0.44	1.00	0.2	A		

Intersection Delay = 43.3 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Culver at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: I-405 NB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				493	822			1978	400		1247	660
% Heavy Veh				2	2			2	2		2	2
PHF				0.95	0.95			0.95	0.95		0.95	0.95
PK 15 Vol				130	216			521	105		328	174
Hi Ln Vol												
% Grade				0				0			0	
Ideal Sat				1900	1900			1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				519		865		2082	421		1313	695
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right			
Green		52.1	0.0			8.8	32.4	0.0
Yellow		4.3				4.3	3.6	
All Red		3.5				3.5	2.5	

Cycle Length: 115.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				493	822			1978	400		1247	660
PHF				0.95	0.95			0.95	0.95		0.95	0.95
Adj flow				519	865			2082	421		1313	695
No. Lanes	0	0	0	2	0	1	0	3	1	0	3	1
Lane group				L		R		T	R		T	R
Adj flow				519		865		2082	421		1313	695
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		T		R
So				1900		1900	1900	1900		1900		1900
Lanes	0	0	0	2	0	1	0 3	1	0	3		1
fW				1.000		1.000	1.000	1.000		1.000		1.000
fHV				0.980		0.980	0.980	0.980		0.980		0.980
fG				1.000		1.000	1.000	1.000		1.000		1.000
fP				1.000		1.000	1.000	1.000		1.000		1.000
fBB				1.000		1.000	1.000	1.000		1.000		1.000
fA				1.000		1.000	1.000	1.000		1.000		1.000
fLU				0.971		1.000	0.908	1.000		0.908		1.000
fRT						0.850	1.000	0.850		1.000		0.850
fLT				0.950			1.000			1.000		
Sec.												
fLpb				1.000			1.000			1.000		
fRpb						1.000	1.000	1.000		1.000		1.000
S				3437		1583	5074	1583		5074		1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	519	3437		0.15	0.45	1557	0.33
Prot								
Perm								
Thru								
Right	R	865	1583	#	0.55	0.45	717	1.21
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2082	5074	#	0.41	0.43	2162	0.96
Right	R	421	1583		0.27	1.00	1583	0.27
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1313	5074		0.26	0.43	2162	0.61
Right	R	695	1583		0.44	1.00	1583	0.44

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.96
Total lost time per cycle, L = 13.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.09

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.33	0.45	20.3	1.000	1557	0.11	0.1	0.0	20.4	C		
											93.4	F
R	1.21	0.45	31.5	1.000	717	0.50	105.8	0.0	137.2	F		
Northbound												
T	0.96	0.43	32.1	1.000	2162	0.47	11.9	0.0	44.0	D	36.6	D
R	0.27	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.61	0.43	25.6	1.000	2162	0.19	0.5	0.0	26.0	C	17.1	B
R	0.44	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 43.3 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 115.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 115.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	115.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	31.5	20.3	0.00	0.0	0.0	20.4
	0.0						0.0	
R	0.0	0.00	31.5	31.5	0.00	37.0	0.0	137.2
Northbound								
	0.0						0.0	
T	0.0	0.00	33.0	32.1	0.00	0.0	0.0	44.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	33.0	25.6	0.00	0.0	0.0	26.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 43.3 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				267	865	764	421	482	695
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2 0	1	0 3	1	0 3	1
SL				1770	1583	1862	1583	1862	1583
LnCapacity				801	717	793	1583	793	1583
Flow Ratio				0.2	0.5	0.4	0.3	0.3	0.4
v/c Ratio				0.33	1.21	0.96	0.27	0.61	0.44
Grn Ratio				0.45	0.45	0.43	1.00	0.43	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00	1.00		1.00	
Q1				5.5	27.6	23.8		11.9	
kB				0.7	0.7	0.7	1.1	0.7	1.1
Q2				0.3	21.8	6.5	0.4	1.0	0.8
Q Average				5.8	49.4	30.3		13.0	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2	1.1	1.1		1.2	
BOQ				6.9	55.8	34.7		15.2	
QSRatio									
85th Percentile Output:									
fB%				1.5	1.4	1.4		1.5	
BOQ				9.0	67.1	42.7		19.4	
QSRatio									
90th Percentile Output:									
fB%				1.7	1.4	1.5		1.6	
BOQ				9.9	70.8	45.1		20.9	
QSRatio									
95th Percentile Output:									
fB%				1.9	1.5	1.6		1.8	
BOQ				11.3	76.0	48.8		23.2	
QSRatio									
98th Percentile Output:									
fB%				2.3	1.7	1.8		2.1	
BOQ				13.7	85.1	54.5		26.8	
QSRatio									

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 SB Ramps

Inter.: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Volume	290	0	540					1042	277		1826	256
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	26.4	0.0				6.1	22.8	0.0	
Yellow	3.6					4.3	4.3		
All Red	2.5					2.5	2.5		

Cycle Length: 75.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	623	1770	0.49	0.35	19.6	B		
LTR	656	1863	0.00	0.35	15.7	B	50.8	D
R	557	1583	1.02	0.35	67.5	E		
Westbound								
Northbound								
T	2415	5074	0.45	0.48	13.3	B	10.5	B
R	1583	1583	0.18	1.00	0.1	A		
Southbound								
T	2415	5074	0.80	0.48	18.5	B	16.2	B
R	1583	1583	0.17	1.00	0.1	A		

Intersection Delay = 21.2 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB

Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	290	0	540					1042	277		1826	256
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	76	0	142					274	73		481	67
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	305	0	568					1097	292		1922	269
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0				0			0	
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A			NB Left				
Thru	A			Thru	A	A		
Right	A			Right	A	A		
Peds				Peds				
WB Left				SB Left				
Thru				Thru	A	A		
Right				Right	A	A		
Peds				Peds				
NB Right	A			EB Right				
SB Right	A			WB Right				
Green	26.4	0.0			6.1	22.8	0.0	
Yellow	3.6				4.3	4.3		
All Red	2.5				2.5	2.5		

Cycle Length: 75.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	290	0	540					1042	277		1826	256

PHF	0.95	0.95	0.95						0.95	0.95		0.95	0.95				
Adj flow	305	0	568						1097	292		1922	269				
No. Lanes	1	1	1		0	0	0		0	3	1		0	3	1		
Lane group	L	LTR	R							T	R			T	R		
Adj flow	305	0	568						1097	292		1922	269				
Prop LTs		0.000							0.000			0.000					
Prop RTs		0.000	1.000						0.000	1.000		0.000	1.000				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound				Northbound			Southbound		
LG	L	LTR	R					T	R		T	R	
So	1900	1900	1900					1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	0	3	1	0	3	1	
fW	1.000	1.000	1.000					1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980					0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000					1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000					1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000					1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000					1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000					0.908	1.000		0.908	1.000	
fRT		1.000	0.850					1.000	0.850		1.000	0.850	
fLT	0.950	1.000						1.000			1.000		
Sec.													
fLpb	1.000	1.000						1.000			1.000		
fRpb		1.000	1.000					1.000	1.000		1.000	1.000	
S	1770	1863	1583					5074	1583		5074	1583	
Sec.													

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	305	1770		0.17	0.35	623	0.49
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.35	656	0.00
Right	R	568	1583	#	0.36	0.35	557	1.02
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1097	5074		0.22	0.48	2415	0.45
Right	R	292	1583		0.18	1.00	1583	0.18
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1922	5074	#	0.38	0.48	2415	0.80
Right	R	269	1583		0.17	1.00	1583	0.17

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.74
Total lost time per cycle, L = 12.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.89

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.49	0.35	19.0	1.000	623	0.11	0.6	0.0	19.6	B		
LTR	0.00	0.35	15.7	1.000	656	0.11	0.0	0.0	15.7	B	50.8	D
R	1.02	0.35	24.3	1.000	557	0.50	43.2	0.0	67.5	E		
Westbound												

Northbound

T	0.45	0.48	13.1	1.000	2415	0.11	0.1	0.0	13.3	B	10.5	B
R	0.18	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Southbound

T	0.80	0.48	16.6	1.000	2415	0.34	1.9	0.0	18.5	B	16.2	B
R	0.17	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 21.2 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				

Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 75.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	24.3	19.0	0.00	0.0	0.0	19.6
LTR	0.0	0.00	24.3	15.7	0.00	0.0	0.0	15.7
R	0.0	0.00	24.3	24.3	0.00	2.8	0.0	67.5
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	19.7	13.1	0.00	0.0	0.0	13.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	19.7	16.6	0.00	0.0	0.0	18.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 21.2 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup	L	LTR	R				T	R	T	R
Init Queue	0.0	0.0	0.0				0.0	0.0	0.0	0.0
Flow Rate	305	0	568				402	292	705	269
So	1900	1900	1900				1900	1900	1900	1900
No.Lanes	1	1	1	0	0	0	3	1	3	1
SL	1770	1863	1583				1862	1583	1862	1583
LnCapacity	623	656	557				886	1583	886	1583
Flow Ratio	0.2	0.0	0.4				0.2	0.2	0.4	0.2
v/c Ratio	0.49	0.00	1.02				0.45	0.18	0.80	0.17
Grn Ratio	0.35	0.35	0.35				0.48	1.00	0.48	1.00
I Factor		1.000					1.000		1.000	
AT or PVG	3	3	3				3	3	3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00				1.00		1.00	
Q1	5.0	0.0	11.8				5.6		12.4	
kB	0.5	0.5	0.4				0.6	0.8	0.6	0.8
Q2	0.4	0.0	6.3				0.5	0.2	2.1	0.2
Q Average	5.4	0.0	18.1				6.1		14.4	
Q Spacing	25.0	25.0	25.0				25.0	25.0	25.0	25.0
Q Storage	0	0	0				0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2	1.2				1.2		1.2	
BOQ	6.4	0.0	21.1				7.2		16.9	
QSRatio										
85th Percentile Output:										
fB%	1.6	1.6	1.5				1.5		1.5	
BOQ	8.4	0.0	26.5				9.4		21.5	
QSRatio										
90th Percentile Output:										
fB%	1.7	1.8	1.6				1.7		1.6	
BOQ	9.2	0.0	28.3				10.3		23.0	
QSRatio										
95th Percentile Output:										
fB%	1.9	2.1	1.7				1.9		1.8	
BOQ	10.5	0.0	31.2				11.7		25.5	
QSRatio										
98th Percentile Output:										
fB%	2.4	2.7	1.9				2.3		2.0	
BOQ	12.8	0.0	35.3				14.1		29.3	
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 SB Ramps

Inter.: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Culver Drive

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L	LTR	R					T	R		T	R
Volume	874	0	507					1538	747		1300	343
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	42.6	0.0				5.0	17.7	0.0	
Yellow	3.6					4.3	4.3		
All Red	2.5					2.5	2.5		

Cycle Length: 85.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	887	1770	1.04	0.50	61.5	E		
LTR	934	1863	0.00	0.50	10.6	B	45.6	D
R	793	1583	0.67	0.50	18.2	B		
Westbound								
Northbound								
T	1761	5074	0.92	0.35	34.9	C	23.6	C
R	1583	1583	0.50	1.00	0.2	A		
Southbound								
T	1761	5074	0.78	0.35	27.1	C	21.4	C
R	1583	1583	0.23	1.00	0.1	A		

Intersection Delay = 28.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Culver at I-405 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 SB Ramps N/S St: Culver Drive

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	874	0	507					1538	747		1300	343
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	230	0	133					405	197		342	90
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
LGConfig	L	LTR	R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	920	0	534					1619	786		1368	361
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	42.6	0.0			5.0	17.7	0.0	
Yellow	3.6				4.3	4.3		
All Red	2.5				2.5	2.5		

Cycle Length: 85.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	874	0	507					1538	747		1300	343
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	920	0	534					1619	786		1368	361
No. Lanes	1	1	1	0	0	0	0	3	1	0	3	1
Lane group	L	LTR	R					T	R		T	R
Adj flow	920	0	534					1619	786		1368	361
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				T	R		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	1	0	0	0	3	1	0	3	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	1.000				0.908	1.000		0.908	1.000	
fRT		1.000	0.850				1.000	0.850		1.000	0.850	
fLT	0.950	1.000					1.000			1.000		
Sec.												
fLpb	1.000	1.000					1.000			1.000		
fRpb		1.000	1.000				1.000	1.000		1.000	1.000	
S	1770	1863	1583				5074	1583		5074	1583	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	920	1770	#	0.52	0.50	887	1.04
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.50	934	0.00
Right	R	534	1583		0.34	0.50	793	0.67
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1619	5074	#	0.32	0.35	1761	0.92
Right	R	786	1583		0.50	1.00	1583	0.50
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1368	5074		0.27	0.35	1761	0.78
Right	R	361	1583		0.23	1.00	1583	0.23

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.84
Total lost time per cycle, L = 12.90 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.99

Control Delay and LOS Determination

Appr/ Lane	Ratios	Unf Del	Prog Adj	Lane Grp	Incremental Factor	Del	Res Del	Lane Group	Approach

Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
L	1.04	0.50	21.2	1.000	887	0.50	40.3	0.0	61.5	E		
LTR	0.00	0.50	10.6	1.000	934	0.11	0.0	0.0	10.6	B	45.6	D
R	0.67	0.50	16.0	1.000	793	0.25	2.3	0.0	18.2	B		
Westbound												
Northbound												
T	0.92	0.35	26.6	1.000	1761	0.44	8.3	0.0	34.9	C	23.6	C
R	0.50	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												
T	0.78	0.35	24.8	1.000	1761	0.33	2.3	0.0	27.1	C	21.4	C
R	0.23	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 28.6 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 85.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 85.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000

Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 1.000 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	85.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					

XProt
Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	21.2	21.2	0.00	8.2	0.0	61.5
LTR	0.0	0.00	21.2	10.6	0.00	0.0	0.0	10.6
R	0.0	0.00	21.2	16.0	0.00	0.0	0.0	18.2
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	27.8	26.6	0.00	0.0	0.0	34.9
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	27.8	24.8	0.00	0.0	0.0	27.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 28.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup	L	LTR	R				T	R	T	R
Init Queue	0.0	0.0	0.0				0.0	0.0	0.0	0.0
Flow Rate	920	0	534				594	786	502	361
So	1900	1900	1900				1900	1900	1900	1900
No.Lanes	1	1	1	0	0	0	3	1	3	1
SL	1770	1863	1583				1862	1583	1862	1583
LnCapacity	887	934	793				646	1583	646	1583
Flow Ratio	0.5	0.0	0.3				0.3	0.5	0.3	0.2
v/c Ratio	1.04	0.00	0.67				0.92	0.50	0.78	0.23
Grn Ratio	0.50	0.50	0.50				0.35	1.00	0.35	1.00
I Factor		1.000					1.000		1.000	
AT or PVG	3	3	3				3	3	3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00				1.00		1.00	
Q1	21.7	0.0	9.5				13.4		10.6	
kB	0.6	0.6	0.6				0.5	0.9	0.5	0.9
Q2	10.8	0.0	1.2				3.7	0.9	1.6	0.3
Q Average	32.5	0.0	10.6				17.2		12.2	
Q Spacing	25.0	25.0	25.0				25.0	25.0	25.0	25.0
Q Storage	0	0	0				0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.1	1.2	1.2				1.2		1.2	
BOQ	37.2	0.0	12.5				20.0		14.4	
QSRatio										
85th Percentile Output:										
fB%	1.4	1.6	1.5				1.5		1.5	
BOQ	45.5	0.0	16.1				25.2		18.3	
QSRatio										
90th Percentile Output:										
fB%	1.5	1.8	1.6				1.6		1.6	
BOQ	48.0	0.0	17.4				27.0		19.8	
QSRatio										
95th Percentile Output:										
fB%	1.6	2.1	1.8				1.7		1.8	
BOQ	51.9	0.0	19.5				29.7		22.1	
QSRatio										
98th Percentile Output:										
fB%	1.8	2.7	2.1				2.0		2.1	
BOQ	57.9	0.0	22.8				33.8		25.6	
QSRatio										

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 NB Ramps

Inter.: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	3	0	1	0	4	1	0	4	1
LGConfig				L		R		T	R		T	R
Volume				1372		938		1745	491		2093	1712
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right	A	A	
Green	21.8	0.0				6.1	19.1	0.0
Yellow	3.6					4.7	4.7	
All Red	2.0					1.5	1.5	

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1617	4820	0.89	0.34	27.3	C		
							16.5	B
R	1583	1583	0.62	1.00	0.8	A		
Northbound								
T	3268	6765	0.56	0.48	12.1	B	9.5	A
R	1583	1583	0.33	1.00	0.1	A		
Southbound								
T	3268	6765	0.67	0.48	13.4	B	39.1	D
R	1583	1583	1.14	1.00	70.5	E		

Intersection Delay = 24.9 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Jamboree at I-405 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: I-405 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1372		938		1745	491		2093	1712
% Heavy Veh				2		2		2	2		2	2
PHF				0.95		0.95		0.95	0.95		0.95	0.95
PK 15 Vol				361		247		459	129		551	451
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	3	0	1	0	4	1	0	4	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				1444		987		1837	517		2203	1802
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right	A	A	
Green		21.8	0.0			6.1	19.1	0.0
Yellow		3.6				4.7	4.7	
All Red		2.0				1.5	1.5	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1372		938		1745	491		2093	1712
PHF				0.95		0.95		0.95	0.95		0.95	0.95
Adj flow				1444		987		1837	517		2203	1802
No. Lanes	0	0	0	3	0	1	0	4	1	0	4	1
Lane group				L		R		T	R		T	R
Adj flow				1444		987		1837	517		2203	1802
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		T		R
So				1900		1900	1900	1900		1900		1900
Lanes	0	0	0	3	0	1	0 4	1	0	4		1
fW				1.000		1.000	1.000	1.000		1.000		1.000
fHV				0.980		0.980	0.980	0.980		0.980		0.980
fG				1.000		1.000	1.000	1.000		1.000		1.000
fP				1.000		1.000	1.000	1.000		1.000		1.000
fBB				1.000		1.000	1.000	1.000		1.000		1.000
fA				1.000		1.000	1.000	1.000		1.000		1.000
fLU				0.908		1.000	0.908	1.000		0.908		1.000
fRT						0.850	1.000	0.850		1.000		0.850
fLT				0.950			1.000			1.000		
Sec.												
fLpb				1.000			1.000			1.000		
fRpb						1.000	1.000	1.000		1.000		1.000
S				4820		1583	6765	1583		6765		1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Westbound							
Prot							
Perm							
Left	L	1444	4820	0.30	0.34	1617	0.89
Prot							
Perm							
Thru							
Right	R	987	1583	0.62	1.00	1583	0.62
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	1837	6765	0.27	0.48	3268	0.56
Right	R	517	1583	0.33	1.00	1583	0.33
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	2203	6765	0.33	0.48	3268	0.67
Right	R	1802	1583	# 1.14	1.00	1583	1.14

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.14
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.14

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.89	0.34	20.5	1.000	1617	0.42	6.8	0.0	27.3	C		
											16.5	B
R	0.62	1.00	0.0	0.950	1583	0.21	0.8	0.0	0.8	A		
Northbound												
T	0.56	0.48	11.9	1.000	3268	0.16	0.2	0.0	12.1	B	9.5	A
R	0.33	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Southbound												

T	0.67	0.48	12.9	1.000	3268	0.25	0.6	0.0	13.4	B	39.1	D
R	1.14	1.00	0.0	0.950	1583	0.50	70.5	0.0	70.5	E		

Intersection delay = 24.9 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	21.6	20.5	0.00	0.0	0.0	27.3
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.8
Northbound								
	0.0						0.0	
T	0.0	0.00	16.8	11.9	0.00	0.0	0.0	12.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Southbound								
	0.0						0.0	
T	0.0	0.00	16.8	12.9	0.00	0.0	0.0	13.4
R	0.0	0.00	0.0	0.0	0.00	54.7	0.0	70.5

Intersection Delay 24.9 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound	
LaneGroup				L	R	T	R	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				530	987	505	517	606	1802
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	3	0 1	0 4	1	0 4	1
SL				1769	1583	1862	1583	1862	1583
LnCapacity				593	1583	899	1583	899	1583
Flow Ratio				0.3	0.6	0.3	0.3	0.3	1.1
v/c Ratio				0.89	0.62	0.56	0.33	0.67	1.14
Grn Ratio				0.34	1.00	0.48	1.00	0.48	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00		1.00		1.00	
Q1				9.1		6.5		8.4	
kB				0.4	0.7	0.5	0.7	0.5	0.7
Q2				2.6	1.2	0.7	0.4	1.1	32.5
Q Average				11.7		7.1		9.5	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2		1.2		1.2	
BOQ				13.7		8.5		11.1	
QSRatio									
85th Percentile Output:									
fB%				1.5		1.5		1.5	
BOQ				17.6		11.0		14.4	
QSRatio									
90th Percentile Output:									
fB%				1.6		1.7		1.6	
BOQ				19.0		12.0		15.6	
QSRatio									
95th Percentile Output:									
fB%				1.8		1.9		1.9	
BOQ				21.2		13.6		17.5	
QSRatio									
98th Percentile Output:									
fB%				2.1		2.3		2.2	
BOQ				24.6		16.3		20.6	
QSRatio									

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 NB Ramps

Inter.: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	3	0	1	0	4	1	0	4	1
LGConfig				L		R		T	R		T	R
Volume				833		220		3540	900		2647	1140
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
WB Left	A				SB Left				
Thru					Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right	A	A		
Green	13.2	0.0				8.8	25.0	0.0	
Yellow	3.6					4.7	4.7		
All Red	2.0					1.5	1.5		

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
Westbound								
L	979	4820	0.90	0.20	36.0	D		
							28.5	C
R	1583	1583	0.15	1.00	0.0+	A		
Northbound								
T	4163	6765	0.90	0.62	13.6	B	11.0	B
R	1583	1583	0.60	1.00	0.6	A		
Southbound								
T	4163	6765	0.67	0.62	8.6	A	6.7	A
R	1583	1583	0.76	1.00	2.2	A		

Intersection Delay = 11.2 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB

Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Jamboree at I-405 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 NB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				833	220			3540	900		2647	1140
% Heavy Veh				2	2			2	2		2	2
PHF				0.95	0.95			0.95	0.95		0.95	0.95
PK 15 Vol				219	58			932	237		697	300
Hi Ln Vol												
% Grade				0				0			0	
Ideal Sat				1900	1900			1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0	3	0	1	0	4	1	0	4	1
LGConfig				L		R		T	R		T	R
Lane Width				12.0		12.0		12.0	12.0		12.0	12.0
RTOR Vol						0			0			0
Adj Flow				877		232		3726	947		2786	1200
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses				0		0		0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0		0.0	0.0
Arriv. Type				3		3		3	3		3	3
Unit Ext.				3.0		3.0		3.0	3.0		3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0		2.0	2.0
Ext of g				2.0		2.0		2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right	A	A	
Peds					Peds			
NB Right		A			EB Right			
SB Right		A			WB Right	A	A	
Green		13.2	0.0			8.8	25.0	0.0
Yellow		3.6				4.7	4.7	
All Red		2.0				1.5	1.5	

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				833	220			3540	900		2647	1140

PHF					0.95		0.95			0.95	0.95			0.95	0.95				
Adj flow					877		232			3726	947			2786	1200				
No. Lanes		0	0	0		3	0	1		0	4	1		0	4	1			
Lane group					L			R			T	R			T	R			
Adj flow					877			232			3726	947			2786	1200			
Prop LTs											0.000				0.000				
Prop RTs								1.000			0.000	1.000			0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound				Northbound				Southbound			
LG				L			R			T	R			T	R	
So				1900			1900			1900	1900			1900	1900	
Lanes	0	0	0	3	0		1	0		4	1	0		4	1	
fW				1.000			1.000			1.000	1.000			1.000	1.000	
fHV				0.980			0.980			0.980	0.980			0.980	0.980	
fG				1.000			1.000			1.000	1.000			1.000	1.000	
fP				1.000			1.000			1.000	1.000			1.000	1.000	
fBB				1.000			1.000			1.000	1.000			1.000	1.000	
fA				1.000			1.000			1.000	1.000			1.000	1.000	
fLU				0.908			1.000			0.908	1.000			0.908	1.000	
fRT							0.850			1.000	0.850			1.000	0.850	
fLT				0.950						1.000				1.000		
Sec.																
fLpb				1.000						1.000				1.000		
fRpb							1.000			1.000	1.000			1.000	1.000	
S				4820			1583			6765	1583			6765	1583	
Sec.																

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Westbound							
Prot							
Perm							
Left	L	877	4820	0.18	0.20	979	0.90
Prot							
Perm							
Thru							
Right	R	232	1583	0.15	1.00	1583	0.15
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	3726	6765	0.55	0.62	4163	0.90
Right	R	947	1583	0.60	1.00	1583	0.60
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	T	2786	6765	0.41	0.62	4163	0.67
Right	R	1200	1583	# 0.76	1.00	1583	0.76

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.76
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.76

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.90	0.20	25.2	1.000	979	0.42	10.8	0.0	36.0	D		

											28.5	C
R	0.15	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Northbound												
T	0.90	0.62	10.7	1.000	4163	0.42	2.9	0.0	13.6	B	11.0	B
R	0.60	1.00	0.0	0.950	1583	0.19	0.6	0.0	0.6	A		
Southbound												
T	0.67	0.62	8.2	1.000	4163	0.24	0.4	0.0	8.6	A	6.7	A
R	0.76	1.00	0.0	0.950	1583	0.31	2.2	0.0	2.2	A		

Intersection delay = 11.2 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lane in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				

Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	25.9	25.2	0.00	0.0	0.0	36.0
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Northbound								
	0.0						0.0	
T	0.0	0.00	12.5	10.7	0.00	0.0	0.0	13.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.6
Southbound								
	0.0						0.0	
T	0.0	0.00	12.5	8.2	0.00	0.0	0.0	8.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.2

Intersection Delay 11.2 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

LaneGroup	Eastbound			Westbound		Northbound		Southbound	
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				321	232	1025	947	767	1200
So				1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	3	0 1	0 4	1	0 4	1
SL				1769	1583	1862	1583	1862	1583
LnCapacity				359	1583	1146	1583	1146	1583
Flow Ratio				0.2	0.1	0.6	0.6	0.4	0.8
v/c Ratio				0.89	0.15	0.89	0.60	0.67	0.76
Grn Ratio				0.20	1.00	0.62	1.00	0.62	1.00
I Factor				1.000		1.000		1.000	
AT or PVG				3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00		1.00		1.00	
Q1				5.6		15.8		9.1	
kB				0.3	0.7	0.6	0.7	0.6	0.7
Q2				1.9	0.1	4.1	1.1	1.2	2.2
Q Average				7.5		19.9		10.3	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0
Q S Ratio									
70th Percentile Output:									
fB%				1.2		1.2		1.2	
BOQ				8.9		23.1		12.1	
QSRatio									
85th Percentile Output:									
fB%				1.5		1.5		1.5	
BOQ				11.5		29.0		15.5	
QSRatio									
90th Percentile Output:									
fB%				1.7		1.5		1.6	
BOQ				12.6		30.9		16.8	
QSRatio									
95th Percentile Output:									
fB%				1.9		1.7		1.8	
BOQ				14.2		33.9		18.9	
QSRatio									
98th Percentile Output:									
fB%				2.3		1.9		2.2	
BOQ				17.0		38.2		22.1	
QSRatio									

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 SB Ramps

Inter.: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L		LTR	R				T	R		T	R
Volume	624	0	1716					1691	654		3133	301
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	55.6	0.0				35.3	15.7	0.0	
Yellow	3.5					4.7	4.7		
All Red	1.5					2.0	2.0		

Cycle Length: 125.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	787	1770	0.83	0.44	38.4	D		
LTR	829	1863	0.00	0.44	19.3	B	186.9	F
R	1247	2803	1.45	0.44	241.0	F		
Westbound								
Northbound								
T	3123	6765	0.57	0.46	24.8	C	18.0	B
R	1583	1583	0.43	1.00	0.2	A		
Southbound								
T	3123	6765	1.06	0.46	67.1	E	61.2	E
R	1583	1583	0.20	1.00	0.1	A		

Intersection Delay = 85.0 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	624	0	1716					1691	654		3133	301
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	164	0	452					445	172		824	79
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	657	0	1806					1780	688		3298	317
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination 1 2 3 4 | 5 6 7 8

EB Left A | NB Left
Thru A | Thru A A
Right A | Right A A
Peds | Peds

WB Left | SB Left
Thru | Thru A A
Right | Right A A
Peds | Peds

NB Right A | EB Right

SB Right A | WB Right

Green	55.6	0.0		35.3	15.7	0.0
Yellow	3.5			4.7	4.7	
All Red	1.5			2.0	2.0	

Cycle Length: 125.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	624	0	1716					1691	654		3133	301
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	657	0	1806					1780	688		3298	317
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
Lane group	L	LTR	R					T	R		T	R
Adj flow	657	0	1806					1780	688		3298	317
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG	L	LTR	R				T	R		T	R	
So	1900	1900	1900				1900	1900		1900	1900	
Lanes	1	1	2	0	0	0	4	1	0	4	1	
fW	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fHV	0.980	0.980	0.980				0.980	0.980		0.980	0.980	
fG	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fP	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fBB	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fA	1.000	1.000	1.000				1.000	1.000		1.000	1.000	
fLU	1.000	1.000	0.885				0.908	1.000		0.908	1.000	
fRT		1.000	0.850				1.000	0.850		1.000	0.850	
fLT	0.950	1.000					1.000			1.000		
Sec.												
fLpb	1.000	1.000					1.000			1.000		
fRpb		1.000	1.000				1.000	1.000		1.000	1.000	
S	1770	1863	2803				6765	1583		6765	1583	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	657	1770		0.37	0.44	787	0.83
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.44	829	0.00
Right	R	1806	2803	#	0.64	0.44	1247	1.45
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1780	6765		0.26	0.46	3123	0.57
Right	R	688	1583		0.43	1.00	1583	0.43
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	3298	6765	#	0.49	0.46	3123	1.06
Right	R	317	1583		0.20	1.00	1583	0.20

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.13
Total lost time per cycle, L = 11.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.25

Control Delay and LOS Determination

Appr/ Lane	Ratios	Unf Del	Prog Adj	Lane Grp	Incremental Factor	Del	Res Del	Lane Group	Approach

Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
L	0.83	0.44	30.6	1.000	787	0.37	7.8	0.0	38.4	D		
LTR	0.00	0.44	19.3	1.000	829	0.11	0.0	0.0	19.3	B	186.9	F
R	1.45	0.44	34.7	1.000	1247	0.50	206.3	0.0	241.0	F		
Westbound												
Northbound												
T	0.57	0.46	24.6	1.000	3123	0.16	0.3	0.0	24.8	C	18.0	B
R	0.43	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												
T	1.06	0.46	33.6	1.000	3123	0.50	33.4	0.0	67.1	E	61.2	E
R	0.20	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		

Intersection delay = 85.0 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000

Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 1.000 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns
EB WB NB SB
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Pedestrian flow rate, Vpedg (p/h)
OCCpedg
Opposing queue clearing green, gq (s)
Eff. ped. green consumed by opp. veh. queue, gq/gp
OCCpedu
Opposing flow rate, Vo (veh/h)
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn

ApbT
Proportion of left turns, PLT
Proportion of left turns using protected phase, PLTA
Left-turn adjustment, fLpb
Permitted Right Turns
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Conflicting bicycle volume, Vbic (bicycles/h)
Vpedg
OCCpedg
Effective green, g (s)
Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

EBLT WBLT NBLT SBLT
Cycle length, C 125.0 sec
Adj. LT vol from Vol Adjustment Worksheet, v
v/c ratio from Capacity Worksheet, X
Protected phase effective green interval, g (s)
Opposing queue effective green interval, gq
Unopposed green interval, gu
Red time r=(C-g-gq-gu)
Arrival rate, qa=v/(3600(max[X,1.0]))
Protected ph. departure rate, Sp=s/3600
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)

XPerm
XProt
Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	34.7	30.6	0.00	0.0	0.0	38.4
LTR	0.0	0.00	34.7	19.3	0.00	0.0	0.0	19.3
R	0.0	0.00	34.7	34.7	0.00	139.7	0.0	241.0
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	33.6	24.6	0.00	0.0	0.0	24.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
T	0.0	0.00	33.6	33.6	0.00	43.8	0.0	67.1
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1

Intersection Delay 85.0 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound			Southbound	
LaneGroup	L	LTR	R				T	R		T	R
Init Queue	0.0	0.0	0.0				0.0	0.0		0.0	0.0
Flow Rate	657	0	1020				490	688		908	317
So	1900	1900	1900				1900	1900		1900	1900
No.Lanes	1	1	2	0	0	0	0	4	1	0	4	1
SL	1770	1863	1584				1862	1583		1862	1583
LnCapacity	787	829	704				859	1583		859	1583
Flow Ratio	0.4	0.0	0.6				0.3	0.4		0.5	0.2
v/c Ratio	0.83	0.00	1.45				0.57	0.43		1.06	0.20
Grn Ratio	0.44	0.44	0.44				0.46	1.00		0.46	1.00
I Factor		1.000					1.000			1.000	
AT or PVG	3	3	3				3	3		3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00		1.00	1.00
PF2	1.00	1.00	1.00				1.00			1.00	
Q1	20.1	0.0	35.4				12.4			31.5	
kB	0.7	0.8	0.7				0.8	1.1		0.8	1.1
Q2	3.1	0.0	41.6				1.0	0.8		12.9	0.3
Q Average	23.2	0.0	77.0				13.4			44.4	
Q Spacing	25.0	25.0	25.0				25.0	25.0		25.0	25.0
Q Storage	0	0	0				0	0		0	0
Q S Ratio											
70th Percentile Output:											
fB%	1.2	1.2	1.1				1.2			1.1	
BOQ	26.9	0.0	85.8				15.7			50.3	
QSRatio											
85th Percentile Output:											
fB%	1.4	1.6	1.3				1.5			1.4	
BOQ	33.4	0.0	102				20.0			60.8	
QSRatio											
90th Percentile Output:											
fB%	1.5	1.8	1.4				1.6			1.4	
BOQ	35.4	0.0	108				21.5			64.1	
QSRatio											
95th Percentile Output:											
fB%	1.7	2.1	1.5				1.8			1.6	
BOQ	38.7	0.0	116				24.0			68.9	
QSRatio											
98th Percentile Output:											
fB%	1.9	2.7	1.7				2.1			1.7	
BOQ	43.4	0.0	131				27.6			77.0	
QSRatio											

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 SB Ramps

Inter.: Jamboree at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Jamboree Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L	LTR	R					T	R		T	R
Volume	1324	0	948					3016	1070		3062	640
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru	A				Thru	A	A		
Right	A				Right	A	A		
Peds					Peds				
WB Left					SB Left				
Thru					Thru	A	A		
Right					Right	A	A		
Peds					Peds				
NB Right	A				EB Right				
SB Right	A				WB Right				
Green	52.6	0.0				12.3	41.7	0.0	
Yellow	3.5					4.7	4.7		
All Red	1.5					2.0	2.0		

Cycle Length: 125.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	745	1770	1.87	0.42	433.3	F		
LTR	784	1863	0.00	0.42	21.0	C	268.6	F
R	1180	2803	0.85	0.42	38.4	D		
Westbound								
Northbound								
T	3285	6765	0.97	0.49	40.4	D	30.3	C
R	1583	1583	0.71	1.00	1.5	A		
Southbound								
T	3285	6765	0.98	0.49	43.2	D	35.8	D
R	1583	1583	0.43	1.00	0.2	A		

Intersection Delay = 86.1 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Jamboree at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: I-405 SB Ramps N/S St: Jamboree Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	1324	0	948					3016	1070		3062	640
% Heavy Veh	2	2	2					2	2		2	2
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
PK 15 Vol	348	0	249					794	282		806	168
Hi Ln Vol												
% Grade		0						0			0	
Ideal Sat	1900	1900	1900					1900	1900		1900	1900
ParkExist												
NumPark												
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
LGConfig	L		LTR	R				T	R		T	R
Lane Width	12.0	12.0	12.0					12.0	12.0		12.0	12.0
RTOR Vol			0						0			0
Adj Flow	1394	0	998					3175	1126		3223	674
%InSharedLn	0		0									
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000
Peds Bikes	0			0			0			0		
Buses	0	0	0					0	0		0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0	0.0					0.0	0.0		0.0	0.0
Arriv. Type	3	3	3					3	3		3	3
Unit Ext.	3.0	3.0	3.0					3.0	3.0		3.0	3.0
I Factor		1.000						1.000			1.000	
Lost Time	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ext of g	2.0	2.0	2.0					2.0	2.0		2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru	A				Thru	A	A	
Right	A				Right	A	A	
Peds					Peds			
WB Left					SB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
NB Right	A				EB Right			
SB Right	A				WB Right			
Green	52.6	0.0			12.3	41.7	0.0	
Yellow	3.5				4.7	4.7		
All Red	1.5				2.0	2.0		

Cycle Length: 125.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	1324	0	948					3016	1070		3062	640
PHF	0.95	0.95	0.95					0.95	0.95		0.95	0.95
Adj flow	1394	0	998					3175	1126		3223	674
No. Lanes	1	1	2	0	0	0	0	4	1	0	4	1
Lane group	L		LTR	R				T	R		T	R
Adj flow	1394	0	998					3175	1126		3223	674
Prop LTs		0.000						0.000			0.000	
Prop RTs		0.000	1.000					0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound							Westbound							Northbound							Southbound						
LG	L		LTR	R											T	R						T	R				
So	1900		1900	1900											1900	1900						1900	1900				
Lanes	1		1	2	0	0	0	0							4	1	0					4	1				
fW	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fHV	0.980		0.980	0.980											0.980	0.980						0.980	0.980				
fG	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fP	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fBB	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fA	1.000		1.000	1.000											1.000	1.000						1.000	1.000				
fLU	1.000		1.000	0.885											0.908	1.000						0.908	1.000				
fRT			1.000	0.850											1.000	0.850						1.000	0.850				
fLT	0.950		1.000												1.000							1.000						
Sec.																												
fLpb	1.000		1.000												1.000							1.000						
fRpb			1.000	1.000											1.000	1.000						1.000	1.000				
S	1770		1863	2803											6765	1583						6765	1583				
Sec.																												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	1394	1770	#	0.79	0.42	745	1.87
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.42	784	0.00
Right	R	998	2803		0.36	0.42	1180	0.85
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	3175	6765		0.47	0.49	3285	0.97
Right	R	1126	1583		0.71	1.00	1583	0.71
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	3223	6765	#	0.48	0.49	3285	0.98
Right	R	674	1583		0.43	1.00	1583	0.43

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.26
Total lost time per cycle, L = 11.70 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.39

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	1.87	0.42	36.2	1.000	745	0.50	397.1	0.0	433.3	F		
LTR	0.00	0.42	21.0	1.000	784	0.11	0.0	0.0	21.0	C	268.6	F
R	0.85	0.42	32.6	1.000	1180	0.38	5.9	0.0	38.4	D		
Westbound												
Northbound												
T	0.97	0.49	31.2	1.000	3285	0.47	9.3	0.0	40.4	D	30.3	C
R	0.71	1.00	0.0	0.950	1583	0.27	1.5	0.0	1.5	A		
Southbound												

T	0.98	0.49	31.6	1.000	3285	0.49	11.7	0.0	43.2	D	35.8	D
R	0.43	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		

Intersection delay = 86.1 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 125.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000		0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	125.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	36.2	36.2	0.00	162.3	0.0	433.3

LTR	0.0	0.00	36.2	21.0	0.00	0.0	0.0	21.0
R	0.0	0.00	36.2	32.6	0.00	0.0	0.0	38.4
Westbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Northbound								
	0.0						0.0	
T	0.0	0.00	32.2	31.2	0.00	0.0	0.0	40.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.5
Southbound								
	0.0						0.0	
T	0.0	0.00	32.2	31.6	0.00	0.0	0.0	43.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2

Intersection Delay 86.1 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound	
LaneGroup	L	LTR	R				T	R	T	R
Init Queue	0.0	0.0	0.0				0.0	0.0	0.0	0.0
Flow Rate	1394	0	563				874	1126	887	674
So	1900	1900	1900				1900	1900	1900	1900
No.Lanes	1	1	2	0	0	0	4	1	4	1
SL	1770	1863	1584				1862	1583	1862	1583
LnCapacity	745	784	666				904	1583	904	1583
Flow Ratio	0.8	0.0	0.4				0.5	0.7	0.5	0.4
v/c Ratio	1.87	0.00	0.85				0.97	0.71	0.98	0.43
Grn Ratio	0.42	0.42	0.42				0.49	1.00	0.49	1.00
I Factor		1.000					1.000		1.000	
AT or PVG	3	3	3				3	3	3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00	1.00	1.00
PF2	1.00	1.00	1.00				1.00		1.00	
Q1	48.4	0.0	17.6				29.4		30.3	
kB	0.7	0.7	0.7				0.8	1.1	0.8	1.1
Q2	82.6	0.0	2.9				7.6	2.6	8.4	0.8
Q Average	131.0		0.0	20.5				37.0		38.6
Q Spacing	25.0	25.0	25.0				25.0	25.0	25.0	25.0
Q Storage	0	0	0				0	0	0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.1	1.2	1.2				1.1		1.1	
BOQ	145	0.0	23.8				42.2		44.0	
QSRatio										
85th Percentile Output:										
fB%	1.3	1.6	1.5				1.4		1.4	
BOQ	171	0.0	29.8				51.4		53.4	
QSRatio										
90th Percentile Output:										
fB%	1.4	1.8	1.5				1.5		1.5	
BOQ	183	0.0	31.7				54.2		56.3	
QSRatio										
95th Percentile Output:										
fB%	1.5	2.1	1.7				1.6		1.6	
BOQ	197	0.0	34.7				58.4		60.6	
QSRatio										
98th Percentile Output:										
fB%	1.7	2.7	1.9				1.8		1.8	
BOQ	223	0.0	39.1				65.1		67.6	
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Volume				965		666		2404	229	211	1575	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	22.8	0.0			5.2	18.2	5.4	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 75.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1045	3437	0.97	0.30	47.1	D		
							40.4	D
R	852	2803	0.82	0.30	30.8	C		
Northbound								
T	2697	6765	0.94	0.40	28.9	C	27.7	C
R	1117	2803	0.22	0.40	14.9	B		
Southbound								
L	238	3437	0.93	0.07	75.0	E		
T	3635	6765	0.46	0.54	10.7	B	18.3	B

Intersection Delay = 28.4 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				965		666		2404	229	211	1575	
% Heavy Veh				2		2		2	2	2	2	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol				254		175		633	60	56	414	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			
Adj Flow				1016		701		2531	241	222	1658	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000	0.000		
Peds Bikes	0			0			0					
Buses				0		0		0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type				3		3		3	3	3	3	
Unit Ext.				3.0		3.0		3.0	3.0	3.0	3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g				2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	22.8	0.0			5.2	18.2	5.4	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 75.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				965		666		2404	229	211	1575	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow				1016		701		2531	241	222	1658	
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
Lane group				L		R		T	R	L	T	
Adj flow				1016		701		2531	241	222	1658	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000	0.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L		R	T	R		L	T	
So				1900		1900	1900	1900		1900	1900	
Lanes	0	0	0	2	0	2	0 4	2		2	4	0
fW				1.000		1.000	1.000	1.000		1.000	1.000	
fHV				0.980		0.980	0.980	0.980		0.980	0.980	
fG				1.000		1.000	1.000	1.000		1.000	1.000	
fP				1.000		1.000	1.000	1.000		1.000	1.000	
fBB				1.000		1.000	1.000	1.000		1.000	1.000	
fA				1.000		1.000	1.000	1.000		1.000	1.000	
fLU				0.971		0.885	0.908	0.885		0.971	0.908	
fRT						0.850	1.000	0.850			1.000	
fLT				0.950			1.000			0.950	1.000	
Sec.												
fLpb				1.000			1.000			1.000	1.000	
fRpb						1.000	1.000	1.000			1.000	
S				3437		2803	6765	2803		3437	6765	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	1016	3437	#	0.30	0.30	1045	0.97
Prot								
Perm								
Thru								
Right	R	701	2803		0.25	0.30	852	0.82
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2531	6765	#	0.37	0.40	2697	0.94
Right	R	241	2803		0.09	0.40	1117	0.22
Southbound								
Prot								
Perm								
Left	L	222	3437	#	0.06	0.07	238	0.93
Prot								
Perm								
Thru	T	1658	6765		0.25	0.54	3635	0.46
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.73
Total lost time per cycle, L = 17.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.95

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.97	0.30	25.8	1.000	1045	0.48	21.3	0.0	47.1	D		
											40.4	D
R	0.82	0.30	24.2	1.000	852	0.36	6.6	0.0	30.8	C		
Northbound												
T	0.94	0.40	21.7	1.000	2697	0.45	7.3	0.0	28.9	C	27.7	C
R	0.22	0.40	14.8	1.000	1117	0.11	0.1	0.0	14.9	B		
Southbound												
L	0.93	0.07	34.7	1.000	238	0.45	40.3	0.0	75.0	E		

T	0.46	0.54	10.6	1.000	3635	0.11	0.1	0.0	10.7	B	18.3	B

Intersection delay = 28.4 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 75.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	75.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	26.1	25.8	0.00	0.0	0.0	47.1
	0.0						0.0	
R	0.0	0.00	26.1	24.2	0.00	0.0	0.0	30.8
Northbound								
	0.0						0.0	
T	0.0	0.00	22.5	21.7	0.00	0.0	0.0	28.9
R	0.0	0.00	22.5	14.8	0.00	0.0	0.0	14.9
Southbound								
L	0.0	0.00	34.9	34.7	0.00	0.0	0.0	75.0
T	0.0	0.00	17.3	10.6	0.00	0.0	0.0	10.7
	0.0						0.0	

Intersection Delay 28.4 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup				L	R	T	R	L	T	
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate				523	396	696	136	114	456	
So				1900	1900	1900	1900	1900	1900	
No.Lanes	0	0	0	2	2	4	2	2	4	0
SL				1770	1584	1862	1584	1770	1862	
LnCapacity				538	481	742	631	122	1000	
Flow Ratio				0.3	0.3	0.4	0.1	0.1	0.2	
v/c Ratio				0.97	0.82	0.94	0.22	0.93	0.46	
Grn Ratio				0.30	0.30	0.40	0.40	0.07	0.54	
I Factor				1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	
PF2				1.00	1.00	1.00	1.00	1.00	1.00	
Q1				10.8	7.7	13.9	1.9	2.4	5.8	
kB				0.4	0.4	0.5	0.5	0.2	0.6	
Q2				4.4	1.6	4.4	0.1	1.2	0.5	
Q Average				15.2	9.3	18.4	2.0	3.5	6.3	
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage				0	0	0	0	0	0	
Q S Ratio										
70th Percentile Output:										
fB%				1.2	1.2	1.2	1.2	1.2	1.2	
BOQ				17.7	10.9	21.3	2.4	4.2	7.5	
QSRatio										
85th Percentile Output:										
fB%				1.5	1.5	1.5	1.6	1.6	1.5	
BOQ				22.5	14.1	26.8	3.1	5.5	9.8	
QSRatio										
90th Percentile Output:										
fB%				1.6	1.7	1.6	1.8	1.7	1.7	
BOQ				24.1	15.3	28.6	3.5	6.1	10.7	
QSRatio										
95th Percentile Output:										
fB%				1.8	1.9	1.7	2.0	2.0	1.9	
BOQ				26.7	17.2	31.5	4.1	7.0	12.2	
QSRatio										
98th Percentile Output:										
fB%				2.0	2.2	1.9	2.6	2.5	2.3	
BOQ				30.5	20.3	35.7	5.1	8.7	14.7	
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Volume				590		340		2320	888	642	1990	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	15.6	0.0			17.3	16.5	12.2	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 85.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	631	3437	0.98	0.18	66.3	E		
							55.4	E
R	514	2803	0.70	0.18	36.6	D		
Northbound								
T	2786	6765	0.88	0.41	26.5	C	26.5	C
R	1154	2803	0.81	0.41	26.5	C		
Southbound								
L	700	3437	0.97	0.20	59.3	E		
T	4576	6765	0.46	0.68	6.5	A	19.4	B

Intersection Delay = 27.7 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Macarthur at I-405 NB Ramps

Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				590		340		2320	888	642	1990	
% Heavy Veh				2		2		2	2	2	2	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
PK 15 Vol				155		89		611	234	169	524	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900	1900	1900	1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
LGConfig				L		R		T	R	L	T	
Lane Width				12.0		12.0		12.0	12.0	12.0	12.0	
RTOR Vol						0			0			
Adj Flow				621		358		2442	935	676	2095	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000	1.000		0.000	
Peds Bikes	0			0			0					
Buses				0		0		0	0	0	0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0	0.0	0.0	0.0	
Arriv. Type				3		3		3	3	3	3	
Unit Ext.				3.0		3.0		3.0	3.0	3.0	3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0	2.0	2.0	2.0	
Ext of g				2.0		2.0		2.0	2.0	2.0	2.0	
Ped Min g		3.2			3.2			3.2				

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru					Thru	A	A	A
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	15.6	0.0			17.3	16.5	12.2	0.0
Yellow	3.6				3.2	4.3	4.3	
All Red	2.0				2.0	2.0	2.0	

Cycle Length: 85.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				590		340		2320	888	642	1990	
PHF				0.95		0.95		0.95	0.95	0.95	0.95	
Adj flow				621		358		2442	935	676	2095	
No. Lanes	0	0	0	2	0	2	0	4	2	2	4	0
Lane group				L		R		T	R	L	T	

Adj flow			621	358		2442	935		676	2095			
Prop LTs						0.000			0.000				
Prop RTs				1.000		0.000	1.000		0.000				

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T	R	L	T		
So			1900		1900		1900	1900	1900	1900		
Lanes	0	0	2	0	2	0	4	2	2	4	0	
fW			1.000		1.000		1.000	1.000	1.000	1.000		
fHV			0.980		0.980		0.980	0.980	0.980	0.980		
fG			1.000		1.000		1.000	1.000	1.000	1.000		
fP			1.000		1.000		1.000	1.000	1.000	1.000		
fBB			1.000		1.000		1.000	1.000	1.000	1.000		
fA			1.000		1.000		1.000	1.000	1.000	1.000		
fLU			0.971		0.885		0.908	0.885	0.971	0.908		
fRT					0.850		1.000	0.850		1.000		
fLT			0.950				1.000		0.950	1.000		
Sec.												
fLpb			1.000				1.000		1.000	1.000		
fRpb					1.000		1.000	1.000		1.000		
S			3437		2803		6765	2803	3437	6765		
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	621	3437	#	0.18	0.18	631	0.98
Prot								
Perm								
Thru								
Right	R	358	2803		0.13	0.18	514	0.70
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2442	6765	#	0.36	0.41	2786	0.88
Right	R	935	2803		0.33	0.41	1154	0.81
Southbound								
Prot								
Perm								
Left	L	676	3437	#	0.20	0.20	700	0.97
Prot								
Perm								
Thru	T	2095	6765		0.31	0.68	4576	0.46
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.74
Total lost time per cycle, L = 17.10 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.92

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.98	0.18	34.6	1.000	631	0.49	31.7	0.0	66.3	E		
											55.4	E
R	0.70	0.18	32.5	1.000	514	0.26	4.1	0.0	36.6	D		
Northbound												

T	0.88	0.41	23.0	1.000	2786	0.40	3.5	0.0	26.5	C	26.5	C
R	0.81	0.41	22.1	1.000	1154	0.35	4.5	0.0	26.5	C		
Southbound												
L	0.97	0.20	33.6	1.000	700	0.47	25.7	0.0	59.3	E		
T	0.46	0.68	6.4	1.000	4576	0.11	0.1	0.0	6.5	A	19.4	B

Intersection delay = 27.7 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 85.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 85.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				

n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	85.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane	Initial Unmet Demand	Dur. Unmet Demand	Uniform Delay Unadj.	Uniform Delay Adj.	Initial Queue Param.	Final Unmet Demand	Initial Queue Delay	Lane Group Delay

Group	Q veh	t hrs.	ds	d1 sec	u	Q veh	d3 sec	d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	34.7	34.6	0.00	0.0	0.0	66.3
	0.0						0.0	
R	0.0	0.00	34.7	32.5	0.00	0.0	0.0	36.6
Northbound								
	0.0						0.0	
T	0.0	0.00	25.0	23.0	0.00	0.0	0.0	26.5
R	0.0	0.00	25.0	22.1	0.00	0.0	0.0	26.5
Southbound								
L	0.0	0.00	33.9	33.6	0.00	0.0	0.0	59.3
T	0.0	0.00	13.8	6.4	0.00	0.0	0.0	6.5
	0.0						0.0	

Intersection Delay 27.7 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound				Westbound		Northbound			Southbound		
LaneGroup					L	R	T	R		L	T	
Init Queue					0.0	0.0	0.0	0.0		0.0	0.0	
Flow Rate					319	202	672	528		348	576	
So					1900	1900	1900	1900		1900	1900	
No.Lanes	0	0	0		2	0 2	0 4	2		2	4	0
SL					1770	1584	1862	1584		1770	1862	
LnCapacity					324	290	767	651		360	1259	
Flow Ratio					0.2	0.1	0.4	0.3		0.2	0.3	
v/c Ratio					0.98	0.70	0.88	0.81		0.97	0.46	
Grn Ratio					0.18	0.18	0.41	0.41		0.20	0.68	
I Factor					1.000		1.000				1.000	
AT or PVG					3	3	3	3		3	3	
Pltn Ratio					1.00	1.00	1.00	1.00		1.00	1.00	
PF2					1.00	1.00	1.00	1.00		1.00	1.00	
Q1					7.5	4.5	14.6	11.0		8.1	6.4	
kB					0.3	0.3	0.6	0.5		0.4	0.8	
Q2					3.4	0.7	3.2	2.0		3.3	0.6	
Q Average					10.9	5.2	17.8	13.0		11.4	7.0	
Q Spacing					25.0	25.0	25.0	25.0		25.0	25.0	
Q Storage					0	0	0	0		0	0	
Q S Ratio												
70th Percentile Output:												
fB%					1.2	1.2	1.2	1.2		1.2	1.2	
BOQ					12.8	6.1	20.7	15.2		13.4	8.3	
QSRatio												
85th Percentile Output:												
fB%					1.5	1.6	1.5	1.5		1.5	1.5	
BOQ					16.4	8.0	26.1	19.4		17.2	10.8	
QSRatio												
90th Percentile Output:												
fB%					1.6	1.7	1.6	1.6		1.6	1.7	
BOQ					17.8	8.8	27.8	20.9		18.6	11.8	
QSRatio												
95th Percentile Output:												
fB%					1.8	2.0	1.7	1.8		1.8	1.9	
BOQ					19.9	10.0	30.6	23.2		20.8	13.4	
QSRatio												
98th Percentile Output:												
fB%					2.1	2.4	2.0	2.1		2.1	2.3	
BOQ					23.2	12.2	34.7	26.8		24.2	16.0	
QSRatio												

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				1004	264	1131		1530	386	228	1667	630
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
WB Left		A			SB Left	A			
Thru		A			Thru	A	A	A	
Right		A			Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right	A	A	A	
Green		20.0	0.0			5.7	5.1	7.5	0.0
Yellow		4.0				3.2	4.3	4.3	
All Red		1.5				0.8	1.8	1.8	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	1146	3437	0.92	0.33	31.4	C		
T	621	1863	0.45	0.33	16.2	B	15.9	B
R	1583	1583	0.75	1.00	2.1	A		
Northbound								
T	2108	6765	0.76	0.31	20.4	C	22.3	C
R	493	1583	0.82	0.31	30.0	C		
Southbound								
L	327	3437	0.73	0.10	34.7	C		
T	3202	6765	0.55	0.47	11.4	B	17.3	B
R	749	1583	0.89	0.47	26.6	C		

Intersection Delay = 18.2 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Macarthur at I-405 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				1004	264	1131		1530	386	228	1667	630
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				264	69	298		403	102	60	439	166
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L	T	R		T	R	L	T	R
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0
Adj Flow				1057	278	1191		1611	406	240	1755	663
%InSharedLn												
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0	0	0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	20.0	0.0			5.7	5.1	7.5	0.0
Yellow	4.0				3.2	4.3	4.3	
All Red	1.5				0.8	1.8	1.8	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				1004	264	1131		1530	386	228	1667	630
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				1057	278	1191		1611	406	240	1755	663
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
Lane group				L		T	R		T	R	L		T	R
Adj flow				1057	278	1191		1611	406	240	1755	663
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	1057	3437		0.31	0.33	1146	0.92
Prot								
Perm								
Thru	T	278	1863		0.15	0.33	621	0.45
Right	R	1191	1583	#	0.75	1.00	1583	0.75
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1611	6765		0.24	0.31	2108	0.76
Right	R	406	1583		0.26	0.31	493	0.82
Southbound								
Prot								
Perm								
Left	L	240	3437		0.07	0.10	327	0.73
Prot								
Perm								
Thru	T	1755	6765		0.26	0.47	3202	0.55
Right	R	663	1583		0.42	0.47	749	0.89

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.75
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.75

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												

Westbound												
L	0.92	0.33	19.3	1.000	1146	0.44	12.2	0.0	31.4	C		
T	0.45	0.33	15.7	1.000	621	0.11	0.5	0.0	16.2	B	15.9	B
R	0.75	1.00	0.0	0.950	1583	0.31	2.1	0.0	2.1	A		
Northbound												
T	0.76	0.31	18.7	1.000	2108	0.32	1.7	0.0	20.4	C	22.3	C
R	0.82	0.31	19.1	1.000	493	0.36	10.9	0.0	30.0	C		
Southbound												
L	0.73	0.10	26.4	1.000	327	0.29	8.3	0.0	34.7	C		
T	0.55	0.47	11.2	1.000	3202	0.15	0.2	0.0	11.4	B	17.3	B
R	0.89	0.47	14.3	1.000	749	0.41	12.3	0.0	26.6	C		

Intersection delay = 18.2 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					

LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 1.000 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					

Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	20.0	19.3	0.00	0.0	0.0	31.4
T	0.0	0.00	20.0	15.7	0.00	0.0	0.0	16.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	2.1
Northbound								
	0.0						0.0	
T	0.0	0.00	20.6	18.7	0.00	0.0	0.0	20.4
R	0.0	0.00	20.6	19.1	0.00	0.0	0.0	30.0
Southbound								
L	0.0	0.00	27.1	26.4	0.00	0.0	0.0	34.7
T	0.0	0.00	15.8	11.2	0.00	0.0	0.0	11.4
R	0.0	0.00	15.8	14.3	0.00	0.0	0.0	26.6

Intersection Delay 18.2 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

LaneGroup	Eastbound			Westbound			Northbound		Southbound		
				L	T	R	T	R	L	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				544	278	1191	443	406	123	483	663
So				1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	1	1	4	1	2	4	1
SL				1770	1863	1583	1862	1583	1770	1862	1583
LnCapacity				590	621	1583	580	493	168	881	749
Flow Ratio				0.3	0.1	0.8	0.2	0.3	0.1	0.3	0.4
v/c Ratio				0.92	0.45	0.75	0.76	0.82	0.73	0.55	0.89
Grn Ratio				0.33	0.33	1.00	0.31	0.31	0.10	0.47	0.47
I Factor					1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1				8.7	3.6		6.7	6.3	2.0	5.7	10.0
kB				0.4	0.4	0.7	0.4	0.4	0.2	0.5	0.5
Q2				3.0	0.3	2.1	1.2	1.5	0.5	0.6	2.8
Q Average				11.8	4.0		7.9	7.7	2.5	6.3	12.8
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0	0
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2		1.2	1.2	1.2	1.2	1.2
BOQ				13.8	4.7		9.3	9.1	2.9	7.5	15.0
QSRatio											
85th Percentile Output:											
fB%				1.5	1.6		1.5	1.5	1.6	1.5	1.5
BOQ				17.7	6.2		12.0	11.8	3.9	9.8	19.1
QSRatio											
90th Percentile Output:											
fB%				1.6	1.7		1.7	1.7	1.8	1.7	1.6
BOQ				19.1	6.8		13.1	12.9	4.3	10.7	20.6
QSRatio											
95th Percentile Output:											
fB%				1.8	2.0		1.9	1.9	2.0	1.9	1.8
BOQ				21.3	7.8		14.8	14.6	5.0	12.2	23.0
QSRatio											
98th Percentile Output:											
fB%				2.1	2.4		2.2	2.3	2.5	2.3	2.1
BOQ				24.8	9.6		17.6	17.4	6.2	14.6	26.5
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				693	299	581		2487	730	603	1589	458
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	21.0	0.0				22.5	24.6	10.2	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	722	3437	1.01	0.21	75.4	E		
T	391	1863	0.81	0.21	49.3	D	42.6	D
R	1583	1583	0.39	1.00	0.2	A		
Northbound								
T	2767	6765	0.95	0.41	36.4	D	57.3	E
R	647	1583	1.19	0.41	128.7	F		
Southbound								
L	773	3437	0.82	0.22	43.9	D		
T	4560	6765	0.37	0.67	7.1	A	15.6	B
R	1067	1583	0.45	0.67	7.9	A		

Intersection Delay = 39.4 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				693	299	581		2487	730	603	1589	458
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				182	79	153		654	192	159	418	121
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L		T	R		T	R	L		T	R
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0				0	
Adj Flow				729	315	612		2618	768	635	1673	482
%InSharedLn												
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000
Peds Bikes	0				0			0			0	
Buses				0	0	0		0	0	0	0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	21.0	0.0				22.5	24.6	10.2	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				693	299	581		2487	730	603	1589	458
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				729	315	612		2618	768	635	1673	482
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
Lane group				L		T	R		T	R	L		T	R
Adj flow				729	315	612		2618	768	635	1673	482
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	729	3437	#	0.21	0.21	722	1.01
Prot								
Perm								
Thru	T	315	1863		0.17	0.21	391	0.81
Right	R	612	1583		0.39	1.00	1583	0.39
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2618	6765		0.39	0.41	2767	0.95
Right	R	768	1583	#	0.49	0.41	647	1.19
Southbound								
Prot								
Perm								
Left	L	635	3437	#	0.18	0.22	773	0.82
Prot								
Perm								
Thru	T	1673	6765		0.25	0.67	4560	0.37
Right	R	482	1583		0.30	0.67	1067	0.45

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.88
Total lost time per cycle, L = 15.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.05

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.01	0.21	39.5	1.000	722	0.50	35.9	0.0	75.4	E		
T	0.81	0.21	37.6	1.000	391	0.35	11.7	0.0	49.3	D	42.6	D
R	0.39	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Northbound												
T	0.95	0.41	28.5	1.000	2767	0.46	7.9	0.0	36.4	D	57.3	E
R	1.19	0.41	29.6	1.000	647	0.50	99.1	0.0	128.7	F		
Southbound												
L	0.82	0.22	36.8	1.000	773	0.36	7.1	0.0	43.9	D		

T	0.37	0.67	7.1	1.000	4560	0.11	0.1	0.0	7.1	A	15.6	B
R	0.45	0.67	7.6	1.000	1067	0.11	0.3	0.0	7.9	A		

Intersection delay = 39.4 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 100.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	1.000	0.908	0.908	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	100.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	39.5	39.5	0.00	1.8	0.0	75.4
T	0.0	0.00	39.5	37.6	0.00	0.0	0.0	49.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Northbound								
	0.0						0.0	
T	0.0	0.00	29.6	28.5	0.00	0.0	0.0	36.4
R	0.0	0.00	29.6	29.6	0.00	30.2	0.0	128.7
Southbound								
L	0.0	0.00	38.8	36.8	0.00	0.0	0.0	43.9
T	0.0	0.00	16.3	7.1	0.00	0.0	0.0	7.1
R	0.0	0.00	16.3	7.6	0.00	0.0	0.0	7.9

Intersection Delay 39.4 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound			Northbound		Southbound		
LaneGroup				L	T	R	T	R	L	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				375	315	612	720	768	326	460	482
So				1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	1	1	4	1	2	4	1
SL				1770	1863	1583	1862	1583	1770	1862	1583
LnCapacity				371	391	1583	761	647	398	1255	1067
Flow Ratio				0.2	0.2	0.4	0.4	0.5	0.2	0.2	0.3
v/c Ratio				1.01	0.81	0.39	0.95	1.19	0.82	0.37	0.45
Grn Ratio				0.21	0.21	1.00	0.41	0.41	0.22	0.67	0.67
I Factor					1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1				10.4	8.3		19.3	21.3	8.6	5.5	6.3
kB				0.4	0.4	1.0	0.6	0.6	0.4	0.8	0.8
Q2				4.6	1.5	0.6	5.4	18.1	1.6	0.5	0.6
Q Average				15.0	9.8		24.6	39.5	10.2	6.0	6.9
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0	0
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2		1.2	1.1	1.2	1.2	1.2
BOQ				17.6	11.6		28.4	44.9	12.0	7.1	8.2
QSRatio											
85th Percentile Output:											
fB%				1.5	1.5		1.4	1.4	1.5	1.5	1.5
BOQ				22.3	14.9		35.3	54.5	15.5	9.3	10.6
QSRatio											
90th Percentile Output:											
fB%				1.6	1.6		1.5	1.5	1.6	1.7	1.7
BOQ				23.9	16.1		37.4	57.4	16.8	10.2	11.6
QSRatio											
95th Percentile Output:											
fB%				1.8	1.8		1.7	1.6	1.8	1.9	1.9
BOQ				26.5	18.1		40.7	61.8	18.8	11.6	13.2
QSRatio											
98th Percentile Output:											
fB%				2.0	2.2		1.9	1.7	2.2	2.3	2.3
BOQ				30.3	21.3		45.6	69.0	22.0	14.0	15.8
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				693	299	581		2487	730	603	1589	458
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru		A	A	
Right					Right		A	A	
Peds					Peds				
WB Left		A			SB Left	A			
Thru		A			Thru	A	A	A	
Right		A			Right	A	A	A	
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right	A	A	A	
Green		21.0	0.0			22.5	24.6	10.2	0.0
Yellow		4.0				3.2	4.3	4.3	
All Red		1.5				0.8	1.8	1.8	

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
Westbound								
L	722	3437	1.01	0.21	75.4	E		
T	391	1863	0.81	0.21	49.3	D	42.6	D
R	1583	1583	0.39	1.00	0.2	A		
Northbound								
T	2767	6765	0.95	0.41	36.4	D	57.3	E
R	647	1583	1.19	0.41	128.7	F		
Southbound								
L	773	3437	0.82	0.22	43.9	D		
T	4560	6765	0.37	0.67	7.1	A	15.6	B
R	1067	1583	0.45	0.67	7.9	A		

Intersection Delay = 39.4 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB

Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				693	299	581		2487	730	603	1589	458
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				182	79	153		654	192	159	418	121
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
LGConfig				L		T	R		T	R	L		T	R
Lane Width				12.0	12.0	12.0		12.0	12.0		12.0	12.0	12.0
RTOR Vol						0			0				0	
Adj Flow				729	315	612		2618	768		635	1673	482
%InSharedLn													
Prop LTs					0.000			0.000			0.000		
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000	
Peds Bikes	0				0			0			0		
Buses				0	0	0		0	0		0	0	0
%InProtPhase													

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	21.0	0.0				22.5	24.6	10.2	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				693	299	581		2487	730	603	1589	458

PHF			0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95	
Adj flow			729	315	612		2618	768	635	1673	482	
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
Lane group				L	T	R		T	R	L	T	R
Adj flow				729	315	612		2618	768	635	1673	482
Prop LTs					0.000			0.000			0.000	
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	729	3437	#	0.21	0.21	722	1.01
Prot								
Perm								
Thru	T	315	1863		0.17	0.21	391	0.81
Right	R	612	1583		0.39	1.00	1583	0.39
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2618	6765		0.39	0.41	2767	0.95
Right	R	768	1583	#	0.49	0.41	647	1.19
Southbound								
Prot								
Perm								
Left	L	635	3437	#	0.18	0.22	773	0.82
Prot								
Perm								
Thru	T	1673	6765		0.25	0.67	4560	0.37
Right	R	482	1583		0.30	0.67	1067	0.45

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.88
Total lost time per cycle, L = 15.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.05

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	1.01	0.21	39.5	1.000	722	0.50	35.9	0.0	75.4	E		

T	0.81	0.21	37.6	1.000	391	0.35	11.7	0.0	49.3	D	42.6	D
R	0.39	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Northbound												
T	0.95	0.41	28.5	1.000	2767	0.46	7.9	0.0	36.4	D	57.3	E
R	1.19	0.41	29.6	1.000	647	0.50	99.1	0.0	128.7	F		
Southbound												
L	0.82	0.22	36.8	1.000	773	0.36	7.1	0.0	43.9	D		
T	0.37	0.67	7.1	1.000	4560	0.11	0.1	0.0	7.1	A	15.6	B
R	0.45	0.67	7.6	1.000	1067	0.11	0.3	0.0	7.9	A		

Intersection delay = 39.4 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

			EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach						
Cycle length, C	100.0	sec				
Total actual green time for LT lane group, G (s)						
Effective permitted green time for LT lane group, g(s)						
Opposing effective green time, go (s)						
Number of lanes in LT lane group, N						
Number of lanes in opposing approach, No						
Adjusted LT flow rate, VLT (veh/h)						
Proportion of LT in LT lane group, PLT						
Proportion of LT in opposing flow, PLTo						
Adjusted opposing flow rate, Vo (veh/h)						
Lost time for LT lane group, tL						
Computation						
LT volume per cycle, LTC=VLTC/3600						
Opposing lane util. factor, fLUo			1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)						
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g						
Opposing platoon ratio, Rpo (refer Exhibit 16-11)						
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]						
gq, (see Exhibit C16-4,5,6,7,8)						
gu=g-gq if gq>=gf, or = g-gf if gq<gf						
n=Max(gq-gf)/2,0)						
PTHo=1-PLTo						
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]						
EL1 (refer to Exhibit C16-3)						
EL2=Max((1-Ptho**n)/Plto, 1.0)						
fmin=2(1+PL)/g or fmin=2(1+Pl)/g						
gdiff=max(gq-gf,0)						
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)						
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**						
Left-turn adjustment, fLT						

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

			EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach						
Cycle length, C	100.0	sec				
Total actual green time for LT lane group, G (s)						
Effective permitted green time for LT lane group, g(s)						
Opposing effective green time, go (s)						
Number of lanes in LT lane group, N						
Number of lanes in opposing approach, No						
Adjusted LT flow rate, VLT (veh/h)						
Proportion of LT in LT lane group, PLT				0.000	0.000	0.000
Proportion of LT in opposing flow, PLTo						
Adjusted opposing flow rate, Vo (veh/h)						
Lost time for LT lane group, tL						
Computation						
LT volume per cycle, LTC=VLTC/3600						
Opposing lane util. factor, fLUo			1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)						
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g						

Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 100.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	39.5	39.5	0.00	1.8	0.0	75.4
T	0.0	0.00	39.5	37.6	0.00	0.0	0.0	49.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Northbound								
	0.0						0.0	
T	0.0	0.00	29.6	28.5	0.00	0.0	0.0	36.4
R	0.0	0.00	29.6	29.6	0.00	30.2	0.0	128.7
Southbound								
L	0.0	0.00	38.8	36.8	0.00	0.0	0.0	43.9
T	0.0	0.00	16.3	7.1	0.00	0.0	0.0	7.1
R	0.0	0.00	16.3	7.6	0.00	0.0	0.0	7.9

Intersection Delay 39.4 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

LaneGroup	Eastbound			Westbound			Northbound		Southbound		
				L	T	R	T	R	L	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				375	315	612	720	768	326	460	482
So				1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	1	1	4	1	2	4	1
SL				1770	1863	1583	1862	1583	1770	1862	1583
LnCapacity				371	391	1583	761	647	398	1255	1067
Flow Ratio				0.2	0.2	0.4	0.4	0.5	0.2	0.2	0.3
v/c Ratio				1.01	0.81	0.39	0.95	1.19	0.82	0.37	0.45
Grn Ratio				0.21	0.21	1.00	0.41	0.41	0.22	0.67	0.67
I Factor					1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1				10.4	8.3		19.3	21.3	8.6	5.5	6.3
kB				0.4	0.4	1.0	0.6	0.6	0.4	0.8	0.8
Q2				4.6	1.5	0.6	5.4	18.1	1.6	0.5	0.6
Q Average				15.0	9.8		24.6	39.5	10.2	6.0	6.9
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0	0
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2		1.2	1.1	1.2	1.2	1.2
BOQ				17.6	11.6		28.4	44.9	12.0	7.1	8.2
QSRatio											
85th Percentile Output:											
fB%				1.5	1.5		1.4	1.4	1.5	1.5	1.5
BOQ				22.3	14.9		35.3	54.5	15.5	9.3	10.6
QSRatio											
90th Percentile Output:											
fB%				1.6	1.6		1.5	1.5	1.6	1.7	1.7
BOQ				23.9	16.1		37.4	57.4	16.8	10.2	11.6
QSRatio											
95th Percentile Output:											
fB%				1.8	1.8		1.7	1.6	1.8	1.9	1.9
BOQ				26.5	18.1		40.7	61.8	18.8	11.6	13.2
QSRatio											
98th Percentile Output:											
fB%				2.0	2.2		1.9	1.7	2.2	2.3	2.3
BOQ				30.3	21.3		45.6	69.0	22.0	14.0	15.8
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 NB Ramps

Inter.: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	2	1	1	0	4	1	2	4	1
LGConfig				L	T	R		T	R	L	T	R
Volume				693	299	581		2487	730	603	1589	458
Lane Width				12.0	12.0	12.0		12.0	12.0	12.0	12.0	12.0
RTOR Vol						0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru		A	A
Right					Right		A	A
Peds					Peds			
WB Left		A			SB Left	A		
Thru		A			Thru	A	A	A
Right		A			Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green		21.0	0.0			22.5	24.6	10.2	0.0
Yellow		4.0				3.2	4.3	4.3	
All Red		1.5				0.8	1.8	1.8	

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	722	3437	1.01	0.21	75.4	E		
T	391	1863	0.81	0.21	49.3	D	42.6	D
R	1583	1583	0.39	1.00	0.2	A		
Northbound								
T	2767	6765	0.95	0.41	36.4	D	57.3	E
R	647	1583	1.19	0.41	128.7	F		
Southbound								
L	773	3437	0.82	0.22	43.9	D		
T	4560	6765	0.37	0.67	7.1	A	15.6	B
R	1067	1583	0.45	0.67	7.9	A		

Intersection Delay = 39.4 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Macarthur at I-405 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: I-405 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				693	299	581		2487	730	603	1589	458
% Heavy Veh				2	2	2		2	2	2	2	2
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
PK 15 Vol				182	79	153		654	192	159	418	121
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900	1900	1900		1900	1900	1900	1900	1900
ParkExist												
NumPark												
No. Lanes	0	0	0		2	1	1		0	4	1		2	4	1
LGConfig				L		T	R			T	R	L		T	R
Lane Width				12.0	12.0	12.0			12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol						0				0				0	
Adj Flow				729	315	612			2618	768	635	1673	482
%InSharedLn													
Prop LTs					0.000				0.000			0.000	
Prop RTs					0.000	1.000			0.000	1.000		0.000	1.000
Peds Bikes	0				0				0			0	
Buses				0	0	0			0	0	0	0	0
%InProtPhase													

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0
Arriv. Type				3	3	3		3	3	3	3	3
Unit Ext.				3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0
I Factor					1.000				1.000		1.000	
Lost Time				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ext of g				2.0	2.0	2.0		2.0	2.0	2.0	2.0	2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right	A	A	
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A				Thru	A	A	A
Right	A				Right	A	A	A
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right	A	A	A
Green	21.0	0.0				22.5	24.6	10.2	0.0
Yellow	4.0					3.2	4.3	4.3	
All Red	1.5					0.8	1.8	1.8	

Cycle Length: 100.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				693	299	581		2487	730	603	1589	458
PHF				0.95	0.95	0.95		0.95	0.95	0.95	0.95	0.95
Adj flow				729	315	612		2618	768	635	1673	482
No. Lanes	0	0	0		2	1	1	0	4	1		2	4	1
Lane group				L		T	R		T	R	L		T	R
Adj flow				729	315	612		2618	768		635	1673	482	
Prop LTs					0.000			0.000			0.000			
Prop RTs					0.000	1.000		0.000	1.000		0.000	1.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG				L	T	R		T	R	L	T	R
So				1900	1900	1900		1900	1900	1900	1900	1900
Lanes	0	0	0	2	1	1	0	4	1	2	4	1
fW				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fHV				0.980	0.980	0.980		0.980	0.980	0.980	0.980	0.980
fG				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fP				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fBB				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fA				1.000	1.000	1.000		1.000	1.000	1.000	1.000	1.000
fLU				0.971	1.000	1.000		0.908	1.000	0.971	0.908	1.000
fRT					1.000	0.850		1.000	0.850		1.000	0.850
fLT				0.950	1.000			1.000		0.950	1.000	
Sec.												
fLpb				1.000	1.000			1.000		1.000	1.000	
fRpb					1.000	1.000		1.000	1.000		1.000	1.000
S				3437	1863	1583		6765	1583	3437	6765	1583
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group		Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru									
Right									
Westbound									
Prot									
Perm									
Left	L		729	3437	#	0.21	0.21	722	1.01
Prot									
Perm									
Thru	T		315	1863		0.17	0.21	391	0.81
Right	R		612	1583		0.39	1.00	1583	0.39
Northbound									
Prot									
Perm									
Left									
Prot									
Perm									
Thru	T		2618	6765		0.39	0.41	2767	0.95
Right	R		768	1583	#	0.49	0.41	647	1.19
Southbound									
Prot									
Perm									
Left	L		635	3437	#	0.18	0.22	773	0.82
Prot									
Perm									
Thru	T		1673	6765		0.25	0.67	4560	0.37
Right	R		482	1583		0.30	0.67	1067	0.45

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.88
Total lost time per cycle, L = 15.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.05

Control Delay and LOS Determination

Appr/ Lane	Ratios	Unf Del	Prog Adj	Lane Grp	Incremental Factor	Del	Res Del	Lane Group	Approach

Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
Westbound												
L	1.01	0.21	39.5	1.000	722	0.50	35.9	0.0	75.4	E		
T	0.81	0.21	37.6	1.000	391	0.35	11.7	0.0	49.3	D	42.6	D
R	0.39	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Northbound												
T	0.95	0.41	28.5	1.000	2767	0.46	7.9	0.0	36.4	D	57.3	E
R	1.19	0.41	29.6	1.000	647	0.50	99.1	0.0	128.7	F		
Southbound												
L	0.82	0.22	36.8	1.000	773	0.36	7.1	0.0	43.9	D		
T	0.37	0.67	7.1	1.000	4560	0.11	0.1	0.0	7.1	A	15.6	B
R	0.45	0.67	7.6	1.000	1067	0.11	0.3	0.0	7.9	A		

Intersection delay = 39.4 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	100.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		1.000		0.908	0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	100.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT			0.000	0.000	0.000

Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 1.000 0.908 0.908
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				

Permitted Right Turns

Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 100.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				

XProt
Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	39.5	39.5	0.00	1.8	0.0	75.4
T	0.0	0.00	39.5	37.6	0.00	0.0	0.0	49.3
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Northbound								
	0.0						0.0	
T	0.0	0.00	29.6	28.5	0.00	0.0	0.0	36.4
R	0.0	0.00	29.6	29.6	0.00	30.2	0.0	128.7
Southbound								
L	0.0	0.00	38.8	36.8	0.00	0.0	0.0	43.9
T	0.0	0.00	16.3	7.1	0.00	0.0	0.0	7.1
R	0.0	0.00	16.3	7.6	0.00	0.0	0.0	7.9

Intersection Delay 39.4 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

LaneGroup	Eastbound			Westbound			Northbound		Southbound		
				L	T	R	T	R	L	T	R
Init Queue				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Flow Rate				375	315	612	720	768	326	460	482
So				1900	1900	1900	1900	1900	1900	1900	1900
No.Lanes	0	0	0	2	1	1	4	1	2	4	1
SL				1770	1863	1583	1862	1583	1770	1862	1583
LnCapacity				371	391	1583	761	647	398	1255	1067
Flow Ratio				0.2	0.2	0.4	0.4	0.5	0.2	0.2	0.3
v/c Ratio				1.01	0.81	0.39	0.95	1.19	0.82	0.37	0.45
Grn Ratio				0.21	0.21	1.00	0.41	0.41	0.22	0.67	0.67
I Factor					1.000		1.000			1.000	
AT or PVG				3	3	3	3	3	3	3	3
Pltn Ratio				1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PF2				1.00	1.00		1.00	1.00	1.00	1.00	1.00
Q1				10.4	8.3		19.3	21.3	8.6	5.5	6.3
kB				0.4	0.4	1.0	0.6	0.6	0.4	0.8	0.8
Q2				4.6	1.5	0.6	5.4	18.1	1.6	0.5	0.6
Q Average				15.0	9.8		24.6	39.5	10.2	6.0	6.9
Q Spacing				25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0
Q Storage				0	0	0	0	0	0	0	0
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2		1.2	1.1	1.2	1.2	1.2
BOQ				17.6	11.6		28.4	44.9	12.0	7.1	8.2
QSRatio											
85th Percentile Output:											
fB%				1.5	1.5		1.4	1.4	1.5	1.5	1.5
BOQ				22.3	14.9		35.3	54.5	15.5	9.3	10.6
QSRatio											
90th Percentile Output:											
fB%				1.6	1.6		1.5	1.5	1.6	1.7	1.7
BOQ				23.9	16.1		37.4	57.4	16.8	10.2	11.6
QSRatio											
95th Percentile Output:											
fB%				1.8	1.8		1.7	1.6	1.8	1.9	1.9
BOQ				26.5	18.1		40.7	61.8	18.8	11.6	13.2
QSRatio											
98th Percentile Output:											
fB%				2.0	2.2		1.9	1.7	2.2	2.3	2.3
BOQ				30.3	21.3		45.6	69.0	22.0	14.0	15.8
QSRatio											

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 SB Ramps

Inter.: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
LGConfig		TR	R	L	T						LT	R
Volume		1959	276	93	532					801	151	248
Lane Width		12.0	12.0	12.0	12.0						12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	6.0	37.6	28.3	0.0		34.7	0.0	
Yellow	3.0	4.0	4.0			3.3		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 124.9 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	2013	3547	1.02	0.57	53.5	D	48.7	D
R	899	1583	0.32	0.57	14.5	B		
Westbound								
L	85	1770	1.15	0.05	204.2	F		
T	2297	3547	0.24	0.65	9.3	A	38.3	D
Northbound								
Southbound								
LT	945	3403	1.06	0.28	91.7	F	81.3	F
R	440	1583	0.59	0.28	41.2	D		

Intersection Delay = 56.7 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Baker at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: SR-55 SB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1959	276	93	532					801	151	248
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		516	73	24	140					211	40	65
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900	1900	1900						1900	1900
ParkExist												
NumPark												
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
LGConfig		TR	R	L	T						LT	R
Lane Width		12.0	12.0	12.0	12.0						12.0	12.0
RTOR Vol			0									0
Adj Flow		2062	291	98	560						1002	261
%InSharedLn			0									
Prop LTs		0.000			0.000						0.841	
Prop RTs		0.000	1.000		0.000						0.000	1.000
Peds Bikes	0						0			0		
Buses		0	0	0	0						0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0	0.0	0.0						0.0	0.0
Arriv. Type		3	3	3	3						3	3
Unit Ext.		3.0	3.0	3.0	3.0						3.0	3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0	2.0	2.0						2.0	2.0
Ext of g		2.0	2.0	2.0	2.0						2.0	2.0
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	6.0	37.6	28.3	0.0	34.7	0.0		
Yellow	3.0	4.0	4.0		3.3			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 124.9 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1959	276	93	532					801	151	248
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		2062	291	98	560					843	159	261
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
Lane group		TR	R	L	T						LT	R
Adj flow		2062	291	98	560						1002	261
Prop LTs		0.000			0.000						0.841	
Prop RTs		0.000	1.000		0.000						0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound		Westbound		Northbound					Southbound	
LG	TR	R	L	T						LT	R
So	1900	1900	1900	1900						1900	1900
Lanes 0	2	1	1	2	0	0	0	0	0	2	1
fW	1.000	1.000	1.000	1.000						1.000	1.000
fHV	0.980	0.980	0.980	0.980						0.980	0.980
fG	1.000	1.000	1.000	1.000						1.000	1.000
fP	1.000	1.000	1.000	1.000						1.000	1.000
fBB	1.000	1.000	1.000	1.000						1.000	1.000
fA	1.000	1.000	1.000	1.000						1.000	1.000
fLU	0.952	1.000	1.000	0.952						0.952	1.000
fRT	1.000	0.850		1.000						1.000	0.850
fLT	1.000		0.950	1.000						0.960	
Sec.											
fLpb	1.000		1.000	1.000						1.000	
fRpb	1.000	1.000		1.000						1.000	1.000
S	3547	1583	1770	3547						3403	1583
Sec.											

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	2062	3547	#	0.58	0.57	2013	1.02
Right	R	291	1583		0.18	0.57	899	0.32
Westbound								
Prot								
Perm								
Left	L	98	1770	#	0.06	0.05	85	1.15
Prot								
Perm								
Thru	T	560	3547		0.16	0.65	2297	0.24
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	1002	3403	#	0.29	0.28	945	1.06
Right	R	261	1583		0.16	0.28	440	0.59

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.93
Total lost time per cycle, L = 13.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.04

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	1.02	0.57	27.0	1.000	2013	0.50	26.5	0.0	53.5	D	48.7	D
R	0.32	0.57	14.3	1.000	899	0.11	0.2	0.0	14.5	B		
Westbound												
L	1.15	0.05	59.4	1.000	85	0.50	144.7	0.0	204.2	F		
T	0.24	0.65	9.2	1.000	2297	0.11	0.1	0.0	9.3	A	38.3	D
Northbound												
Southbound												

LT	1.06	0.28	45.1	1.000	945	0.50	46.6	0.0	91.7	F	81.3 F
R	0.59	0.28	39.0	1.000	440	0.18	2.2	0.0	41.2	D	

Intersection delay = 56.7 (sec/veh) Intersection LOS = E

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	124.9 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	124.9 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000	0.000		0.841
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	124.9 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

TR	0.0	0.00	27.0	27.0	0.00	12.3	0.0	53.5
R	0.0	0.00	27.0	14.3	0.00	0.0	0.0	14.5
Westbound								
L	0.0	0.00	59.4	59.4	0.00	3.3	0.0	204.2
T	0.0	0.00	22.0	9.2	0.00	0.0	0.0	9.3
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LT	0.0	0.00	45.1	45.1	0.00	14.3	0.0	91.7
R	0.0	0.00	45.1	39.0	0.00	0.0	0.0	41.2

Intersection Delay 56.7 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound			Southbound	
LaneGroup	TR	R	L	T					LT	R
Init Queue	0.0	0.0	0.0	0.0					0.0	0.0
Flow Rate	1082	291	98	294					526	261
So	1900	1900	1900	1900					1900	1900
No.Lanes	2	1	1	2	0	0	0	0	2	1
SL	1862	1583	1770	1862					1787	1583
LnCapacity	1057	899	85	1206					496	440
Flow Ratio	0.6	0.2	0.1	0.2					0.3	0.2
v/c Ratio	1.02	0.32	1.15	0.24					1.06	0.59
Grn Ratio	0.57	0.57	0.05	0.65					0.28	0.28
I Factor	1.000			1.000					1.000	
AT or PVG	3	3	3	3					3	3
Pltn Ratio	1.00	1.00	1.00	1.00					1.00	1.00
PF2	1.00	1.00	1.00	1.00					1.00	1.00
Q1	37.5	5.3	3.4	4.3					18.2	7.8
kB	0.9	0.8	0.2	0.9					0.6	0.5
Q2	12.5	0.4	2.5	0.3					8.2	0.7
Q Average	50.0	5.7	5.9	4.6					26.4	8.6
Q Spacing	25.0	25.0	25.0	25.0					25.0	25.0
Q Storage	0	0	0	0					0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.1	1.2	1.2	1.2					1.2	1.2
BOQ	56.5	6.8	7.1	5.4					30.4	10.1
QSRatio										
85th Percentile Output:										
fB%	1.4	1.5	1.5	1.6					1.4	1.5
BOQ	67.9	8.9	9.2	7.1					37.6	13.1
QSRatio										
90th Percentile Output:										
fB%	1.4	1.7	1.7	1.7					1.5	1.7
BOQ	71.7	9.7	10.1	7.9					39.8	14.2
QSRatio										
95th Percentile Output:										
fB%	1.5	1.9	1.9	2.0					1.6	1.9
BOQ	76.9	11.1	11.5	9.0					43.3	16.0
QSRatio										
98th Percentile Output:										
fB%	1.7	2.3	2.3	2.4					1.8	2.2
BOQ	86.1	13.4	13.9	11.0					48.4	19.0
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 SB Ramps

Inter.: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Baker Street

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
LGConfig		TR	R	L	T						LT	R
Volume		857	535	355	1433					283	360	497
Lane Width		12.0	12.0	12.0	12.0						12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
WB Left	A				SB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	18.4	17.8	11.4	0.0		29.1	0.0		
Yellow	3.0	4.0	4.0			3.3			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	1277	3547	0.71	0.36	27.9	C	42.0	D
R	570	1583	0.99	0.36	64.6	E		
Westbound								
L	343	1770	1.09	0.19	113.3	F		
T	2113	3547	0.71	0.60	14.7	B	34.3	C
Northbound								
Southbound								
LT	1063	3470	0.64	0.31	29.7	C	58.8	E
R	485	1583	1.08	0.31	96.5	F		

Intersection Delay = 43.2 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB

Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Baker at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 SB Ramps N/S St: Baker Street

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		857	535	355	1433					283	360	497
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		226	141	93	377					74	95	131
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900	1900	1900						1900	1900
ParkExist												
NumPark												
No. Lanes	0	2	1	1	2	0	0	0	0	0	2	1
LGConfig		TR	R	L	T						LT	R
Lane Width		12.0	12.0	12.0	12.0						12.0	12.0
RTOR Vol			0									0
Adj Flow		902	563	374	1508						677	523
%InSharedLn			0									
Prop LTs		0.000			0.000						0.440	
Prop RTs		0.000	1.000		0.000						0.000	1.000
Peds Bikes		0						0			0	
Buses		0	0	0	0						0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0	0.0	0.0						0.0	0.0
Arriv. Type		3	3	3	3						3	3
Unit Ext.		3.0	3.0	3.0	3.0						3.0	3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0	2.0	2.0						2.0	2.0
Ext of g		2.0	2.0	2.0	2.0						2.0	2.0
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left								
Thru		A	A					
Right		A	A					
Peds								
WB Left	A							
Thru	A	A	A					
Right								
Peds								
NB Left								
Thru								
Right								
Peds								
SB Left	A							
Thru	A							
Right	A							
Peds								
NB Right					EB Right			
SB Right					WB Right			
Green	18.4	17.8	11.4	0.0	29.1	0.0		
Yellow	3.0	4.0	4.0		3.3			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		857	535	355	1433					283	360	497

PHF			0.95	0.95		0.95	0.95										0.95	0.95	0.95				
Adj flow			902	563		374	1508										298	379	523				
No. Lanes		0	2	1		1	2	0		0	0	0					0	2	1				
Lane group			TR	R		L	T											LT	R				
Adj flow			902	563		374	1508											677	523				
Prop LTs			0.000				0.000											0.440					
Prop RTs		0.000	1.000			0.000											0.000	1.000					

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound				Northbound				Southbound			
LG		TR	R		L	T								LT	R	
So		1900	1900		1900	1900								1900	1900	
Lanes	0	2	1		1	2	0		0	0	0	0	0	2	1	
fW		1.000	1.000		1.000	1.000								1.000	1.000	
fHV		0.980	0.980		0.980	0.980								0.980	0.980	
fG		1.000	1.000		1.000	1.000								1.000	1.000	
fP		1.000	1.000		1.000	1.000								1.000	1.000	
fBB		1.000	1.000		1.000	1.000								1.000	1.000	
fA		1.000	1.000		1.000	1.000								1.000	1.000	
fLU		0.952	1.000		1.000	0.952								0.952	1.000	
fRT		1.000	0.850			1.000								1.000	0.850	
fLT		1.000			0.950	1.000								0.978		
Sec.																
fLpb		1.000			1.000	1.000								1.000		
fRpb		1.000	1.000			1.000								1.000	1.000	
S		3547	1583		1770	3547								3470	1583	
Sec.																

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	902	3547		0.25	0.36	1277	0.71
Right	R	563	1583	#	0.36	0.36	570	0.99
Westbound								
Prot								
Perm								
Left	L	374	1770	#	0.21	0.19	343	1.09
Prot								
Perm								
Thru	T	1508	3547		0.43	0.60	2113	0.71
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	677	3470		0.20	0.31	1063	0.64
Right	R	523	1583	#	0.33	0.31	485	1.08

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.90
Total lost time per cycle, L = 13.30 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.04

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	0.71	0.36	26.1	1.000	1277	0.27	1.8	0.0	27.9	C	42.0	D
R	0.99	0.36	30.2	1.000	570	0.49	34.4	0.0	64.6	E		
Westbound												
L	1.09	0.19	38.3	1.000	343	0.50	75.0	0.0	113.3	F		

T	0.71	0.60	13.5	1.000	2113	0.28	1.2	0.0	14.7	B	34.3	C

Northbound

Southbound

LT	0.64	0.31	28.4	1.000	1063	0.22	1.3	0.0	29.7	C	58.8	E
R	1.08	0.31	33.0	1.000	485	0.50	63.6	0.0	96.5	F		

Intersection delay = 43.2 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	95.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000	0.000		0.440
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					

Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
TR	0.0	0.00	30.4	26.1	0.00	0.0	0.0	27.9
R	0.0	0.00	30.4	30.2	0.00	0.0	0.0	64.6
Westbound								
L	0.0	0.00	38.3	38.3	0.00	7.7	0.0	113.3
T	0.0	0.00	19.2	13.5	0.00	0.0	0.0	14.7
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LT	0.0	0.00	33.0	28.4	0.00	0.0	0.0	29.7
R	0.0	0.00	33.0	33.0	0.00	9.5	0.0	96.5

Intersection Delay 43.2 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound			Northbound			Southbound	
LaneGroup	TR	R	L	T					LT	R
Init Queue	0.0	0.0	0.0	0.0					0.0	0.0
Flow Rate	473	563	374	792					355	523
So	1900	1900	1900	1900					1900	1900
No.Lanes	2	1	1	2	0	0	0	0	2	1
SL	1862	1583	1770	1862					1822	1583
LnCapacity	670	570	343	1109					558	485
Flow Ratio	0.3	0.4	0.2	0.4					0.2	0.3
v/c Ratio	0.71	0.99	1.09	0.71					0.64	1.08
Grn Ratio	0.36	0.36	0.19	0.60					0.31	0.31
I Factor	1.000			1.000					1.000	
AT or PVG	3	3	3	3					3	3
Pltn Ratio	1.00	1.00	1.00	1.00					1.00	1.00
PF2	1.00	1.00	1.00	1.00					1.00	1.00
Q1	10.7	14.8	9.9	14.7					8.1	13.8
kB	0.6	0.5	0.4	0.8					0.5	0.5
Q2	1.3	5.6	6.6	1.8					0.8	8.4
Q Average	12.0	20.3	16.4	16.5					8.9	22.2
Q Spacing	25.0	25.0	25.0	25.0					25.0	25.0
Q Storage	0	0	0	0					0	0
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2	1.2	1.2					1.2	1.2
BOQ	14.1	23.6	19.2	19.3					10.5	25.7
QSRatio										
85th Percentile Output:										
fB%	1.5	1.5	1.5	1.5					1.5	1.4
BOQ	18.0	29.5	24.2	24.3					13.6	32.0
QSRatio										
90th Percentile Output:										
fB%	1.6	1.5	1.6	1.6					1.7	1.5
BOQ	19.4	31.4	25.9	26.0					14.8	34.0
QSRatio										
95th Percentile Output:										
fB%	1.8	1.7	1.7	1.7					1.9	1.7
BOQ	21.7	34.4	28.6	28.7					16.6	37.1
QSRatio										
98th Percentile Output:										
fB%	2.1	1.9	2.0	2.0					2.2	1.9
BOQ	25.2	38.8	32.6	32.7					19.7	41.7
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 NB Ramps

Inter.: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
LGConfig	L	T			T	R		LT	R			
Volume	262	1582			229	259	121	749	278			
Lane Width	12.0	12.0			12.0	12.0		12.0	12.0			
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	14.0	5.9	6.3	0.0		19.6	0.0		
Yellow	3.6	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	381	1770	0.72	0.22	30.4	C		
T	1954	3547	0.85	0.55	16.2	B	18.2	B
Westbound								
T	939	3547	0.26	0.26	19.0	B	22.1	C
R	419	1583	0.65	0.26	24.8	C		
Northbound								
LT	1062	3522	0.86	0.30	28.8	C	27.1	C
R	477	1583	0.61	0.30	21.8	C		
Southbound								

Intersection Delay = 21.7 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: SR-55 NB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	262	1582			229	259	121	749	278			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	69	416			60	68	32	197	73			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900		1900	1900			
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
LGConfig	L	T			T	R		LT	R			
Lane Width	12.0	12.0			12.0	12.0		12.0	12.0			
RTOR Vol					0				0			
Adj Flow	276	1665			241	273		915	293			
%InSharedLn												
Prop LTs		0.000			0.000			0.139				
Prop RTs		0.000			0.000	1.000		0.000	1.000			
Peds Bikes					0			0			0	
Buses	0	0			0	0		0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0		0.0	0.0			
Arriv. Type	3	3			3	3		3	3			
Unit Ext.	3.0	3.0			3.0	3.0		3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0		2.0	2.0			
Ext of g	2.0	2.0			2.0	2.0		2.0	2.0			
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	14.0	5.9	6.3	0.0		19.6	0.0	
Yellow	3.6	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 65.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	262	1582			229	259	121	749	278			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	276	1665			241	273	127	788	293			
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
Lane group	L	T			T	R		LT	R			
Adj flow	276	1665			241	273		915	293			
Prop LTs		0.000			0.000			0.139				
Prop RTs		0.000			0.000	1.000		0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound			Northbound			Southbound		
LG	L	T			T	R		LT	R				
So	1900	1900			1900	1900		1900	1900				
Lanes	1	2	0	0	2	1	0	2	1	0	0	0	
fW	1.000	1.000			1.000	1.000		1.000	1.000				
fHV	0.980	0.980			0.980	0.980		0.980	0.980				
fG	1.000	1.000			1.000	1.000		1.000	1.000				
fP	1.000	1.000			1.000	1.000		1.000	1.000				
fBB	1.000	1.000			1.000	1.000		1.000	1.000				
fA	1.000	1.000			1.000	1.000		1.000	1.000				
fLU	1.000	0.952			0.952	1.000		0.952	1.000				
fRT		1.000			1.000	0.850		1.000	0.850				
fLT	0.950	1.000			1.000			0.993					
Sec.													
fLpb	1.000	1.000			1.000			1.000					
fRpb		1.000			1.000	1.000		1.000	1.000				
S	1770	3547			3547	1583		3522	1583				
Sec.													

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	276	1770		0.16	0.22	381	0.72
Prot								
Perm								
Thru	T	1665	3547	#	0.47	0.55	1954	0.85
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	241	3547		0.07	0.26	939	0.26
Right	R	273	1583		0.17	0.26	419	0.65
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	915	3522	#	0.26	0.30	1062	0.86
Right	R	293	1583		0.19	0.30	477	0.61
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.73
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.86

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.72	0.22	23.7	1.000	381	0.29	6.7	0.0	30.4	C		
T	0.85	0.55	12.4	1.000	1954	0.38	3.9	0.0	16.2	B	18.2	B
Westbound												
T	0.26	0.26	18.9	1.000	939	0.11	0.1	0.0	19.0	B	22.1	C
R	0.65	0.26	21.2	1.000	419	0.23	3.6	0.0	24.8	C		
Northbound												
LT	0.86	0.30	21.4	1.000	1062	0.39	7.4	0.0	28.8	C	27.1	C
R	0.61	0.30	19.5	1.000	477	0.20	2.4	0.0	21.8	C		
Southbound												

Intersection delay = 21.7 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 65.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.139	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	65.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	25.5	23.7	0.00	0.0	0.0	30.4

T	0.0	0.00	14.6	12.4	0.00	0.0	0.0	16.2
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	23.9	18.9	0.00	0.0	0.0	19.0
R	0.0	0.00	23.9	21.2	0.00	0.0	0.0	24.8
Northbound								
	0.0						0.0	
LT	0.0	0.00	22.7	21.4	0.00	0.0	0.0	28.8
R	0.0	0.00	22.7	19.5	0.00	0.0	0.0	21.8
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 21.7 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup	L	T		T	R	LT	R			
Init Queue	0.0	0.0		0.0	0.0	0.0	0.0			
Flow Rate	276	874		126	273	480	293			
So	1900	1900		1900	1900	1900	1900			
No.Lanes	1	2	0	0	2	1	0	2	1	0	0	0
SL	1770	1862		1862	1583	1849	1583			
LnCapacity	381	1026		493	419	557	477			
Flow Ratio	0.2	0.5		0.1	0.2	0.3	0.2			
v/c Ratio	0.72	0.85		0.26	0.65	0.86	0.61			
Grn Ratio	0.22	0.55		0.26	0.26	0.30	0.30			
I Factor		1.000		1.000		1.000				
AT or PVG	3	3		3	3	3	3			
Pltn Ratio	1.00	1.00		1.00	1.00	1.00	1.00			
PF2	1.00	1.00		1.00	1.00	1.00	1.00			
Q1	4.6	13.4		1.8	4.4	8.2	4.5			
kB	0.3	0.6		0.4	0.3	0.4	0.4			
Q2	0.8	2.9		0.1	0.6	2.1	0.6			
Q Average	5.4	16.2		1.9	5.0	10.2	5.1			
Q Spacing	25.0	25.0		25.0	25.0	25.0	25.0			
Q Storage	0	0		0	0	0	0			
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2		1.2	1.2	1.2	1.2			
BOQ	6.4	18.9		2.3	5.9	12.0	6.1			
QSRatio										
85th Percentile Output:										
fB%	1.6	1.5		1.6	1.6	1.5	1.6			
BOQ	8.4	23.9		3.0	7.8	15.5	7.9			
QSRatio										
90th Percentile Output:										
fB%	1.7	1.6		1.8	1.7	1.6	1.7			
BOQ	9.2	25.6		3.4	8.5	16.8	8.7			
QSRatio										
95th Percentile Output:										
fB%	1.9	1.7		2.0	2.0	1.8	2.0			
BOQ	10.5	28.3		3.9	9.8	18.8	10.0			
QSRatio										
98th Percentile Output:										
fB%	2.4	2.0		2.6	2.4	2.2	2.4			
BOQ	12.8	32.3		4.9	11.9	22.1	12.1			
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 NB Ramps

Inter.: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
LGConfig	L	T			T	R		LT	R			
Volume	161	584			987	607	163	862	216			
Lane Width	12.0	12.0			12.0	12.0		12.0	12.0			
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru	A	A	A		Thru	A			
Right					Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	10.4	5.1	30.2	0.0		30.1	0.0		
Yellow	3.6	4.0	4.0			3.6			
All Red	1.0	1.0	1.0			1.0			

Cycle Length: 95.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	194	1770	0.87	0.11	73.9	E		
T	2065	3547	0.30	0.58	10.1	B	23.9	C
Westbound								
T	1505	3547	0.69	0.42	23.6	C	33.6	C
R	672	1583	0.95	0.42	49.7	D		
Northbound								
LT	1115	3519	0.97	0.32	51.5	D	47.2	D
R	502	1583	0.45	0.32	26.5	C		
Southbound								

Intersection Delay = 36.3 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Paularino at SR-55 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: SR-55 NB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	161	584			987	607	163	862	216			
% Heavy Veh	2	2			2	2	2	2	2			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
PK 15 Vol	42	154			260	160	43	227	57			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat	1900	1900			1900	1900		1900	1900			
ParkExist												
NumPark												
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
LGConfig	L	T			T	R		LT	R			
Lane Width	12.0	12.0			12.0	12.0		12.0	12.0			
RTOR Vol					0			0				
Adj Flow	169	615			1039	639		1079	227			
%InSharedLn												
Prop LTs		0.000			0.000			0.159				
Prop RTs		0.000			0.000	1.000		0.000	1.000			
Peds Bikes					0			0			0	
Buses	0	0			0	0		0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0	0.0			0.0	0.0		0.0	0.0			
Arriv. Type	3	3			3	3		3	3			
Unit Ext.	3.0	3.0			3.0	3.0		3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time	2.0	2.0			2.0	2.0		2.0	2.0			
Ext of g	2.0	2.0			2.0	2.0		2.0	2.0			
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	10.4	5.1	30.2	0.0		30.1	0.0	
Yellow	3.6	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 95.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	161	584			987	607	163	862	216			
PHF	0.95	0.95			0.95	0.95	0.95	0.95	0.95			
Adj flow	169	615			1039	639	172	907	227			
No. Lanes	1	2	0	0	2	1	0	2	1	0	0	0
Lane group	L	T			T	R		LT	R			
Adj flow	169	615			1039	639		1079	227			
Prop LTs		0.000			0.000			0.159				
Prop RTs		0.000			0.000	1.000		0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound				Westbound			Northbound			Southbound		
LG	L	T			T	R		LT	R				
So	1900	1900			1900	1900		1900	1900				
Lanes	1	2	0	0	2	1	0	2	1	0	0	0	
fW	1.000	1.000			1.000	1.000		1.000	1.000				
fHV	0.980	0.980			0.980	0.980		0.980	0.980				
fG	1.000	1.000			1.000	1.000		1.000	1.000				
fP	1.000	1.000			1.000	1.000		1.000	1.000				
fBB	1.000	1.000			1.000	1.000		1.000	1.000				
fA	1.000	1.000			1.000	1.000		1.000	1.000				
fLU	1.000	0.952			0.952	1.000		0.952	1.000				
fRT		1.000			1.000	0.850		1.000	0.850				
fLT	0.950	1.000			1.000			0.992					
Sec.													
fLpb	1.000	1.000			1.000			1.000					
fRpb		1.000			1.000	1.000		1.000	1.000				
S	1770	3547			3547	1583		3519	1583				
Sec.													

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left	L	169	1770	#	0.10	0.11	194	0.87
Prot								
Perm								
Thru	T	615	3547		0.17	0.58	2065	0.30
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1039	3547		0.29	0.42	1505	0.69
Right	R	639	1583	#	0.40	0.42	672	0.95
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	1079	3519	#	0.31	0.32	1115	0.97
Right	R	227	1583		0.14	0.32	502	0.45
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.81
Total lost time per cycle, L = 14.20 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.95

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
L	0.87	0.11	41.6	1.000	194	0.40	32.2	0.0	73.9	E		
T	0.30	0.58	10.0	1.000	2065	0.11	0.1	0.0	10.1	B	23.9	C
Westbound												
T	0.69	0.42	22.3	1.000	1505	0.26	1.4	0.0	23.6	C	33.6	C
R	0.95	0.42	26.4	1.000	672	0.46	23.3	0.0	49.7	D		
Northbound												
LT	0.97	0.32	32.0	1.000	1115	0.47	19.6	0.0	51.5	D	47.2	D
R	0.45	0.32	25.9	1.000	502	0.11	0.6	0.0	26.5	C		
Southbound												

Intersection delay = 36.3 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 95.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000	0.159	
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952		0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	95.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
L	0.0	0.00	42.3	41.6	0.00	0.0	0.0	73.9

T	0.0	0.00	19.8	10.0	0.00	0.0	0.0	10.1
	0.0						0.0	
Westbound								
	0.0						0.0	
T	0.0	0.00	27.3	22.3	0.00	0.0	0.0	23.6
R	0.0	0.00	27.3	26.4	0.00	0.0	0.0	49.7
Northbound								
	0.0						0.0	
LT	0.0	0.00	32.5	32.0	0.00	0.0	0.0	51.5
R	0.0	0.00	32.5	25.9	0.00	0.0	0.0	26.5
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 36.3 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound		Southbound		
LaneGroup	L	T		T	R	LT	R			
Init Queue	0.0	0.0		0.0	0.0	0.0	0.0			
Flow Rate	169	323		545	639	566	227			
So	1900	1900		1900	1900	1900	1900			
No.Lanes	1	2	0	0	2	1	0	2	1	0	0	0
SL	1770	1862		1862	1583	1848	1583			
LnCapacity	194	1084		790	672	585	502			
Flow Ratio	0.1	0.2		0.3	0.4	0.3	0.1			
v/c Ratio	0.87	0.30		0.69	0.95	0.97	0.45			
Grn Ratio	0.11	0.58		0.42	0.42	0.32	0.32			
I Factor		1.000		1.000		1.000				
AT or PVG	3	3		3	3	3	3			
Pltn Ratio	1.00	1.00		1.00	1.00	1.00	1.00			
PF2	1.00	1.00		1.00	1.00	1.00	1.00			
Q1	4.4	4.3		11.7	16.3	14.7	4.8			
kB	0.3	0.7		0.6	0.6	0.5	0.5			
Q2	1.3	0.3		1.3	4.9	5.0	0.4			
Q Average	5.7	4.6		13.0	21.2	19.7	5.2			
Q Spacing	25.0	25.0		25.0	25.0	25.0	25.0			
Q Storage	0	0		0	0	0	0			
Q S Ratio										
70th Percentile Output:										
fB%	1.2	1.2		1.2	1.2	1.2	1.2			
BOQ	6.7	5.5		15.3	24.6	22.9	6.1			
QSRatio										
85th Percentile Output:										
fB%	1.5	1.6		1.5	1.4	1.5	1.6			
BOQ	8.8	7.2		19.5	30.7	28.7	8.0			
QSRatio										
90th Percentile Output:										
fB%	1.7	1.7		1.6	1.5	1.5	1.7			
BOQ	9.6	7.9		21.0	32.6	30.5	8.8			
QSRatio										
95th Percentile Output:										
fB%	1.9	2.0		1.8	1.7	1.7	2.0			
BOQ	11.0	9.1		23.3	35.7	33.5	10.1			
QSRatio										
98th Percentile Output:										
fB%	2.3	2.4		2.1	1.9	1.9	2.4			
BOQ	13.3	11.1		26.9	40.2	37.8	12.2			
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 SB Ramps

Inter.: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
LGConfig		TR		L	T						LT	R
Volume		1110	180	120	230					740	960	190
Lane Width		12.0		12.0	12.0						12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	5.8	7.3	31.5	0.0		56.6	0.0	
Yellow	3.2	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	1268	3473	1.07	0.37	84.4	F	84.4	F
Westbound								
L	86	1770	1.47	0.05	319.1	F		
T	1590	3547	0.15	0.45	19.6	B	122.2	F
Northbound								
Southbound								
LT	1637	3471	1.09	0.47	84.1	F	77.6	E
R	747	1583	0.27	0.47	19.4	B		

Intersection Delay = 84.5 (sec/veh) Intersection LOS = F

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB

Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 SB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1110	180	120	230					740	960	190
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		292	47	32	61					195	253	50
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900		1900	1900						1900	1900
ParkExist												
NumPark												
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
LGConfig		TR		L	T						LT	R
Lane Width		12.0		12.0	12.0						12.0	12.0
RTOR Vol			0									0
Adj Flow		1357		126	242						1790	200
%InSharedLn												
Prop LTs		0.000			0.000						0.435	
Prop RTs	0.139			0.000						0.000	1.000	
Peds Bikes	0						0			0		
Buses		0		0	0						0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0						0.0	0.0
Arriv. Type		3		3	3						3	3
Unit Ext.		3.0		3.0	3.0						3.0	3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0		2.0	2.0						2.0	2.0
Ext of g		2.0		2.0	2.0						2.0	2.0
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	5.8	7.3	31.5	0.0	56.6	0.0		
Yellow	3.2	4.0	4.0		3.6			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1110	180	120	230					740	960	190

PHF			0.95	0.95		0.95	0.95									0.95	0.95	0.95					
Adj flow			1168	189		126	242									779	1011	200					
No. Lanes		0	2	0		1	2	0		0	0	0				0	2	1					
Lane group			TR			L	T										LT	R					
Adj flow			1357			126	242										1790	200					
Prop LTs			0.000				0.000										0.435						
Prop RTs		0.139				0.000										0.000	1.000						

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	TR		L	T						LT	R	
So	1900		1900	1900						1900	1900	
Lanes	0 2	0	1	2	0	0	0	0	0	2	1	
fW	1.000		1.000	1.000						1.000	1.000	
fHV	0.980		0.980	0.980						0.980	0.980	
fG	1.000		1.000	1.000						1.000	1.000	
fP	1.000		1.000	1.000						1.000	1.000	
fBB	1.000		1.000	1.000						1.000	1.000	
fA	1.000		1.000	1.000						1.000	1.000	
fLU	0.952		1.000	0.952						0.952	1.000	
fRT	0.979			1.000						1.000	0.850	
fLT	1.000		0.950	1.000						0.979		
Sec.												
fLpb	1.000		1.000	1.000						1.000		
fRpb	1.000			1.000						1.000	1.000	
S	3473		1770	3547						3471	1583	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1357	3473	#	0.39	0.37	1268	1.07
Right								
Westbound								
Prot								
Perm								
Left	L	126	1770	#	0.07	0.05	86	1.47
Prot								
Perm								
Thru	T	242	3547		0.07	0.45	1590	0.15
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	1790	3471	#	0.52	0.47	1637	1.09
Right	R	200	1583		0.13	0.47	747	0.27

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.98
Total lost time per cycle, L = 13.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.10

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
TR	1.07	0.37	38.1	1.000	1268	0.50	46.3	0.0	84.4	F	84.4	F
Westbound												
L	1.47	0.05	57.1	1.000	86	0.50	262.0	0.0	319.1	F		

T	0.15	0.45	19.6	1.000	1590	0.11	0.0	0.0	19.6	B	122.2	F

Northbound

Southbound

LT	1.09	0.47	31.7	1.000	1637	0.50	52.4	0.0	84.1	F	77.6	E
R	0.27	0.47	19.2	1.000	747	0.11	0.2	0.0	19.4	B		

Intersection delay = 84.5 (sec/veh) Intersection LOS = F

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		0.435
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				

Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 120.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
TR	0.0	0.00	38.1	38.1	0.00	22.2	0.0	84.4
	0.0						0.0	
Westbound								
L	0.0	0.00	57.1	57.1	0.00	10.0	0.0	319.1
T	0.0	0.00	33.1	19.6	0.00	0.0	0.0	19.6
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LT	0.0	0.00	31.7	31.7	0.00	38.3	0.0	84.1
R	0.0	0.00	31.7	19.2	0.00	0.0	0.0	19.4

Intersection Delay 84.5 sec/veh Intersection LOS F

BACK OF QUEUE WORKSHEET

LaneGroup	Eastbound	Westbound	Northbound	Southbound
Init Queue	0.0	0.0 0.0		0.0 0.0
Flow Rate	712	126 127		940 200
So	1900	1900 1900		1900 1900
No.Lanes	0 2 0	1 2 0	0 0 0	0 2 1
SL	1824	1770 1862		1823 1583
LnCapacity	665	86 835		859 747
Flow Ratio	0.4	0.1 0.1		0.5 0.1
v/c Ratio	1.07	1.47 0.15		1.09 0.27
Grn Ratio	0.37	0.05 0.45		0.47 0.47
I Factor	1.000	1.000		1.000
AT or PVG	3	3 3		3 3
Pltn Ratio	1.00	1.00 1.00		1.00 1.00
PF2	1.00	1.00 1.00		1.00 1.00
Q1	23.7	4.2 2.5		31.3 4.0
kB	0.6	0.2 0.7		0.7 0.7
Q2	11.0	5.5 0.1		15.7 0.3
Q Average	34.8	9.7 2.6		47.1 4.3
Q Spacing	25.0	25.0 25.0		25.0 25.0
Q Storage	0	0 0		0 0
Q S Ratio				
70th Percentile Output:				
fB%	1.1	1.2 1.2		1.1 1.2
BOQ	39.7	11.5 3.1		53.2 5.1
QSRatio				
85th Percentile Output:				
fB%	1.4	1.5 1.6		1.4 1.6
BOQ	48.5	14.8 4.2		64.1 6.7
QSRatio				
90th Percentile Output:				
fB%	1.5	1.6 1.8		1.4 1.7
BOQ	51.1	16.0 4.6		67.7 7.4
QSRatio				
95th Percentile Output:				
fB%	1.6	1.8 2.0		1.5 2.0
BOQ	55.2	18.0 5.3		72.6 8.4
QSRatio				
98th Percentile Output:				
fB%	1.8	2.2 2.5		1.7 2.4
BOQ	61.5	21.2 6.6		81.3 10.4
QSRatio				

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 SB Ramps

Inter.: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Paularino Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
LGConfig		TR		L	T						LT	R
Volume		540	116	295	856					160	689	294
Lane Width		12.0		12.0	12.0						12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	12.8	5.7	5.0	0.0	17.7	0.0		
Yellow	3.2	4.0	4.0		3.6			
All Red	1.0	1.0	1.0		1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
TR	904	3453	0.76	0.26	24.3	C	24.3	C
Westbound								
L	378	1770	0.82	0.21	36.2	D		
T	1933	3547	0.47	0.55	8.5	A	15.6	B
Northbound								
Southbound								
LT	1037	3514	0.86	0.30	27.5	C	26.1	C
R	467	1583	0.66	0.30	22.0	C		

Intersection Delay = 21.6 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Paularino at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 SB Ramps N/S St: Paularino Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		540	116	295	856					160	689	294
% Heavy Veh		2	2	2	2					2	2	2
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
PK 15 Vol		142	31	78	225					42	181	77
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900		1900	1900						1900	1900
ParkExist												
NumPark												
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
LGConfig		TR		L	T						LT	R
Lane Width		12.0		12.0	12.0						12.0	12.0
RTOR Vol			0									0
Adj Flow		690		311	901						893	309
%InSharedLn												
Prop LTs		0.000			0.000						0.188	
Prop RTs		0.177			0.000						0.000	1.000
Peds Bikes		0						0			0	
Buses		0		0	0						0	0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0		0.0	0.0						0.0	0.0
Arriv. Type		3		3	3						3	3
Unit Ext.		3.0		3.0	3.0						3.0	3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0		2.0	2.0						2.0	2.0
Ext of g		2.0		2.0	2.0						2.0	2.0
Ped Min g		3.2						3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
WB Left	A				SB Left	A		
Thru	A	A	A		Thru	A		
Right					Right	A		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	12.8	5.7	5.0	0.0		17.7	0.0	
Yellow	3.2	4.0	4.0			3.6		
All Red	1.0	1.0	1.0			1.0		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		540	116	295	856					160	689	294
PHF		0.95	0.95	0.95	0.95					0.95	0.95	0.95
Adj flow		568	122	311	901					168	725	309
No. Lanes	0	2	0	1	2	0	0	0	0	0	2	1
Lane group		TR		L	T						LT	R
Adj flow		690		311	901						893	309
Prop LTs		0.000			0.000						0.188	
Prop RTs		0.177			0.000						0.000	1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound		Westbound		Northbound				Southbound	
LG	TR		L	T					LT	R
So	1900		1900	1900					1900	1900
Lanes	2	0	1	2	0	0	0	0	2	1
fW	1.000		1.000	1.000					1.000	1.000
fHV	0.980		0.980	0.980					0.980	0.980
fG	1.000		1.000	1.000					1.000	1.000
fP	1.000		1.000	1.000					1.000	1.000
fBB	1.000		1.000	1.000					1.000	1.000
fA	1.000		1.000	1.000					1.000	1.000
fLU	0.952		1.000	0.952					0.952	1.000
fRT	0.973			1.000					1.000	0.850
fLT	1.000		0.950	1.000					0.991	
Sec.										
fLpb	1.000		1.000	1.000					1.000	
fRpb	1.000			1.000					1.000	1.000
S	3453		1770	3547					3514	1583
Sec.										

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	690	3453	#	0.20	0.26	904	0.76
Right								
Westbound								
Prot								
Perm								
Left	L	311	1770	#	0.18	0.21	378	0.82
Prot								
Perm								
Thru	T	901	3547		0.25	0.55	1933	0.47
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	893	3514	#	0.25	0.30	1037	0.86
Right	R	309	1583		0.20	0.30	467	0.66

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.63
Total lost time per cycle, L = 13.80 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.82

Control Delay and LOS Determination

Appr/ Lane	Ratios	Unf Del	Prog Adj	Lane Grp	Incremental Factor	Del	Res Del	Lane Group	Approach

Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
TR	0.76	0.26	20.4	1.000	904	0.32	3.9	0.0	24.3	C	24.3	C
Westbound												
L	0.82	0.21	22.5	1.000	378	0.36	13.7	0.0	36.2	D		
T	0.47	0.55	8.3	1.000	1933	0.11	0.2	0.0	8.5	A	15.6	B
Northbound												
Southbound												
LT	0.86	0.30	20.0	1.000	1037	0.39	7.5	0.0	27.5	C	26.1	C
R	0.66	0.30	18.5	1.000	467	0.24	3.5	0.0	22.0	C		

Intersection delay = 21.6 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.952	0.952	0.952	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000	0.000	0.188	

Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 0.952 0.952 0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns
EB WB NB SB
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Pedestrian flow rate, Vpedg (p/h)
OCCpedg
Opposing queue clearing green, gq (s)
Eff. ped. green consumed by opp. veh. queue, gq/gp
OCCpedu
Opposing flow rate, Vo (veh/h)
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn

ApbT
Proportion of left turns, PLT
Proportion of left turns using protected phase, PLTA
Left-turn adjustment, fLpb
Permitted Right Turns
Effective pedestrian green time, gp (s)
Conflicting pedestrian volume, Vped (p/h)
Conflicting bicycle volume, Vbic (bicycles/h)
Vpedg
OCCpedg
Effective green, g (s)
Vbicg
OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

EBLT WBLT NBLT SBLT
Cycle length, C 60.0 sec
Adj. LT vol from Vol Adjustment Worksheet, v
v/c ratio from Capacity Worksheet, X
Protected phase effective green interval, g (s)
Opposing queue effective green interval, gq
Unopposed green interval, gu
Red time r=(C-g-gq-gu)
Arrival rate, qa=v/(3600(max[X,1.0]))
Protected ph. departure rate, Sp=s/3600
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)

XPerm
XProt
Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
TR	0.0	0.00	22.1	20.4	0.00	0.0	0.0	24.3
	0.0						0.0	
Westbound								
L	0.0	0.00	23.6	22.5	0.00	0.0	0.0	36.2
T	0.0	0.00	13.6	8.3	0.00	0.0	0.0	8.5
	0.0						0.0	
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
	0.0						0.0	
LT	0.0	0.00	21.1	20.0	0.00	0.0	0.0	27.5
R	0.0	0.00	21.1	18.5	0.00	0.0	0.0	22.0

Intersection Delay 21.6 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound		Northbound			Southbound	
LaneGroup	TR	L	T				LT	R
Init Queue	0.0	0.0	0.0				0.0	0.0
Flow Rate	362	311	473				469	309
So	1900	1900	1900				1900	1900
No.Lanes	0 2 0	1	2 0	0	0	0	0 2	1
SL	1813	1770	1862				1845	1583
LnCapacity	474	378	1015				544	467
Flow Ratio	0.2	0.2	0.3				0.3	0.2
v/c Ratio	0.76	0.82	0.47				0.86	0.66
Grn Ratio	0.26	0.21	0.55				0.30	0.30
I Factor	1.000		1.000				1.000	
AT or PVG	3	3	3				3	3
Pltn Ratio	1.00	1.00	1.00				1.00	1.00
PF2	1.00	1.00	1.00				1.00	1.00
Q1	5.6	4.9	4.8				7.4	4.5
kB	0.3	0.3	0.5				0.4	0.3
Q2	1.0	1.2	0.5				1.9	0.6
Q Average	6.6	6.2	5.3				9.3	5.2
Q Spacing	25.0	25.0	25.0				25.0	25.0
Q Storage	0	0	0				0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2	1.2	1.2				1.2	1.2
BOQ	7.8	7.3	6.3				11.0	6.1
QSRatio								
85th Percentile Output:								
fB%	1.5	1.5	1.6				1.5	1.6
BOQ	10.2	9.5	8.2				14.2	8.0
QSRatio								
90th Percentile Output:								
fB%	1.7	1.7	1.7				1.7	1.7
BOQ	11.1	10.4	9.0				15.4	8.8
QSRatio								
95th Percentile Output:								
fB%	1.9	1.9	1.9				1.9	2.0
BOQ	12.7	11.9	10.3				17.3	10.1
QSRatio								
98th Percentile Output:								
fB%	2.3	2.3	2.4				2.2	2.4
BOQ	15.2	14.3	12.5				20.4	12.2
QSRatio								

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 NB Ramps

Inter.: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Volume		1324	616		568	283	956		677			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru		A			Thru				
Right		A	A		Right	A			
Peds					Peds				
WB Left					SB Left				
Thru		A	A		Thru				
Right		A	A		Right				
Peds					Peds				
NB Right		A	A		EB Right	A			
SB Right					WB Right	A			
Green		49.7	13.1	0.0		41.6	0.0		
Yellow		4.5	4.5			3.6			
All Red		1.0	1.0			1.0			

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1469	3547	0.95	0.41	47.2	D	32.3	C
R	1583	1583	0.41	1.00	0.2	A		
Westbound								
T	2888	5074	0.21	0.57	12.7	B	8.5	A
R	1583	1583	0.19	1.00	0.1	A		
Northbound								
L	1191	3437	0.84	0.35	42.0	D		
							24.6	C
R	1583	1583	0.45	1.00	0.2	A		
Southbound								

Intersection Delay = 24.9 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Macarthur at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: SR-55 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1324	616		568	283	956		677			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		348	162		149	74	252		178			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900		1900			
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			
Adj Flow		1394	648		598	298	1006		713			
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0	0	0		0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0		0.0			
Arriv. Type		3	3		3	3	3		3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0		3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0		2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0		2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru		A			Thru			
Right		A	A		Right	A		
Peds					Peds			
WB Left					SB Left			
Thru		A	A		Thru			
Right		A	A		Right			
Peds					Peds			
NB Right		A	A		EB Right	A		
SB Right					WB Right	A		
Green		49.7	13.1	0.0		41.6	0.0	
Yellow		4.5	4.5			3.6		
All Red		1.0	1.0			1.0		

Cycle Length: 120.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1324	616		568	283	956		677			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
Adj flow		1394	648		598	298	1006		713			
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
Lane group		T	R		T	R	L		R			
Adj flow		1394	648		598	298	1006		713			
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R		L	R				
So	1900	1900		1900	1900		1900	1900				
Lanes	0 2	0 1	0	0 3	0 1	0	0 2	0 1	0	0	0	0
fW	1.000	1.000		1.000	1.000		1.000	1.000				
fHV	0.980	0.980		0.980	0.980		0.980	0.980				
fG	1.000	1.000		1.000	1.000		1.000	1.000				
fP	1.000	1.000		1.000	1.000		1.000	1.000				
fBB	1.000	1.000		1.000	1.000		1.000	1.000				
fA	1.000	1.000		1.000	1.000		1.000	1.000				
fLU	0.952	1.000		0.908	1.000		0.971	1.000				
fRT	1.000	0.850		1.000	0.850			0.850				
fLT	1.000			1.000			0.950					
Sec.												
fLpb	1.000			1.000			1.000					
fRpb	1.000	1.000		1.000	1.000			1.000				
S	3547	1583		5074	1583		3437	1583				
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1394	3547		0.39	0.41	1469	0.95
Right	R	648	1583		0.41	1.00	1583	0.41
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	598	5074		0.12	0.57	2888	0.21
Right	R	298	1583		0.19	1.00	1583	0.19
Northbound								
Prot								
Perm								
Left	L	1006	3437		0.29	0.35	1191	0.84
Prot								
Perm								
Thru								
Right	R	713	1583	#	0.45	1.00	1583	0.45
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.45
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.45

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.95	0.41	33.9	1.000	1469	0.46	13.3	0.0	47.2	D	32.3	C
R	0.41	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Westbound												
T	0.21	0.57	12.6	1.000	2888	0.11	0.0	0.0	12.7	B	8.5	A
R	0.19	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Northbound												
L	0.84	0.35	36.2	1.000	1191	0.38	5.8	0.0	42.0	D		
											24.6	C
R	0.45	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Southbound												

Intersection delay = 24.9 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 120.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	120.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	35.2	33.9	0.00	0.0	0.0	47.2
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
	0.0						0.0	
T	0.0	0.00	25.8	12.6	0.00	0.0	0.0	12.7
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Northbound								
L	0.0	0.00	39.2	36.2	0.00	0.0	0.0	42.0
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 24.9 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound			Southbound		
LaneGroup	T	R	T	R	L		R			
Init Queue	0.0	0.0	0.0	0.0	0.0		0.0			
Flow Rate	732	648	219	298	518		713			
So	1900	1900	1900	1900	1900		1900			
No.Lanes	0 2	1	0 3	1	2	0 1		0	0	0
SL	1862	1583	1862	1583	1770		1583			
LnCapacity	771	1583	1060	1583	613		1583			
Flow Ratio	0.4	0.4	0.1	0.2	0.3		0.5			
v/c Ratio	0.95	0.41	0.21	0.19	0.85		0.45			
Grn Ratio	0.41	1.00	0.57	1.00	0.35		1.00			
I Factor	1.000		1.000		1.000					
AT or PVG	3	3	3	3	3		3			
Pltn Ratio	1.00	1.00	1.00	1.00	1.00		1.00			
PF2	1.00		1.00		1.00					
Q1	23.6		3.6		16.0					
kB	0.7	1.1	0.8	1.1	0.6		1.1			
Q2	5.9	0.7	0.2	0.3	2.7		0.9			
Q Average	29.5		3.8		18.7					
Q Spacing	25.0	25.0	25.0	25.0	25.0		25.0			
Q Storage	0	0	0	0	0		0			
Q S Ratio										
70th Percentile Output:										
fB%	1.1		1.2		1.2					
BOQ	33.9		4.5		21.7					
QSRatio										
85th Percentile Output:										
fB%	1.4		1.6		1.5					
BOQ	41.7		5.9		27.3					
QSRatio										
90th Percentile Output:										
fB%	1.5		1.7		1.6					
BOQ	44.0		6.6		29.1					
QSRatio										
95th Percentile Output:										
fB%	1.6		2.0		1.7					
BOQ	47.7		7.5		32.0					
QSRatio										
98th Percentile Output:										
fB%	1.8		2.4		1.9					
BOQ	53.2		9.3		36.2					
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 NB Ramps

Inter.: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Volume		778	751		1759	1212	685		233			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru				
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right	A	A			EB Right	A			
SB Right					WB Right	A			
Green	23.0	8.0	0.0			16.4	0.0		
Yellow	1.5	4.5				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1980	3547	0.41	0.56	7.8	A	4.1	A
R	1583	1583	0.50	1.00	0.2	A		
Westbound								
T	2833	5074	0.65	0.56	9.8	A	7.1	A
R	1583	1583	0.81	1.00	3.2	A		
Northbound								
L	939	3437	0.77	0.27	23.9	C		
							17.9	B
R	1583	1583	0.15	1.00	0.0+	A		
Southbound								

Intersection Delay = 8.1 (sec/veh) Intersection LOS = A

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB

Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Macarthur at SR-55 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 NB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		778	751		1759	1212	685		233			
% Heavy Veh		2	2		2	2	2		2			
PHF		0.95	0.95		0.95	0.95	0.95		0.95			
PK 15 Vol		205	198		463	319	180		61			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900		1900			
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	2	0	1	0	0	0
LGConfig		T	R		T	R	L		R			
Lane Width		12.0	12.0		12.0	12.0	12.0		12.0			
RTOR Vol		0			0				0			
Adj Flow		819	791		1852	1276	721		245			
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000			1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0	0	0		0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0		0.0			
Arriv. Type		3	3		3	3	3		3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0		3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0		2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0		2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right	A	A			EB Right	A		
SB Right					WB Right	A		
Green	23.0	8.0	0.0		16.4	0.0		
Yellow	1.5	4.5			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		778	751		1759	1212	685		233			

| | | |

T	0.65	0.56	9.2	1.000	2833	0.23	0.5	0.0	9.8	A	7.1	A
R	0.81	1.00	0.0	0.950	1583	0.35	3.2	0.0	3.2	A		
Northbound												
L	0.77	0.27	20.0	1.000	939	0.32	3.9	0.0	23.9	C		
											17.9	B
R	0.15	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Southbound												

Intersection delay = 8.1 (sec/veh) Intersection LOS = A

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000	0.000		
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					

Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
T	0.0	0.00	13.3	7.6	0.00	0.0	0.0	7.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
	0.0						0.0	
T	0.0	0.00	13.3	9.2	0.00	0.0	0.0	9.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	3.2
Northbound								
L	0.0	0.00	21.8	20.0	0.00	0.0	0.0	23.9
	0.0						0.0	
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 8.1 sec/veh Intersection LOS A

BACK OF QUEUE WORKSHEET

LaneGroup	Eastbound T	Eastbound R	Westbound T	Westbound R	Northbound L	Northbound R	Southbound
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	
Flow Rate	430	791	679	1276	371	245	
So	1900	1900	1900	1900	1900	1900	
No.Lanes	2	1	3	1	2 0	1	0 0 0
SL	1862	1583	1862	1583	1770	1583	
LnCapacity	1039	1583	1040	1583	483	1583	
Flow Ratio	0.2	0.5	0.4	0.8	0.2	0.2	
v/c Ratio	0.41	0.50	0.65	0.81	0.77	0.15	
Grn Ratio	0.56	1.00	0.56	1.00	0.27	1.00	
I Factor	1.000		1.000		1.000		
AT or PVG	3	3	3	3	3	3	
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	
PF2	1.00		1.00		1.00		
Q1	4.1		7.9		5.7		
kB	0.6	0.7	0.6	0.7	0.3	0.7	
Q2	0.4	0.7	1.0	2.8	1.1	0.1	
Q Average	4.5		8.9		6.8		
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	
Q Storage	0	0	0	0	0	0	
Q S Ratio							
70th Percentile Output:							
fB%	1.2		1.2		1.2		
BOQ	5.4		10.5		8.0		
QSRatio							
85th Percentile Output:							
fB%	1.6		1.5		1.5		
BOQ	7.0		13.5		10.4		
QSRatio							
90th Percentile Output:							
fB%	1.7		1.7		1.7		
BOQ	7.7		14.7		11.4		
QSRatio							
95th Percentile Output:							
fB%	2.0		1.9		1.9		
BOQ	8.9		16.6		12.9		
QSRatio							
98th Percentile Output:							
fB%	2.4		2.2		2.3		
BOQ	10.8		19.6		15.5		
QSRatio							

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 SB Ramps

Inter.: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Volume		1271	720		1087	190				869		963
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
WB Left					SB Left	A			
Thru	A	A			Thru				
Right	A	A			Right	A			
Peds					Peds				
NB Right					EB Right	A			
SB Right					WB Right	A			
Green	13.8	6.5	0.0			24.2	0.0		
Yellow	4.0	4.0				3.5			
All Red	1.5	1.5				1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1525	3547	0.88	0.43	21.8	C	14.0	B
R	1583	1583	0.48	1.00	0.2	A		
Westbound								
T	2182	5074	0.52	0.43	12.8	B	10.9	B
R	1583	1583	0.13	1.00	0.0+	A		
Northbound								
Southbound								
L	1386	3437	0.66	0.40	15.7	B		
							21.3	C
R	1131	2803	0.90	0.40	26.3	C		

Intersection Delay = 15.8 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Macarthur at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: SR-55 SB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1271	720		1087	190				869		963
% Heavy Veh		2	2		2	2				2		2
PHF		0.95	0.95		0.95	0.95				0.95		0.95
PK 15 Vol		334	189		286	50				229		253
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900		1900	1900				1900		1900
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
LGConfig		T	R		T	R				L		R
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0
Adj Flow		1338	758		1144	200				915		1014
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000
Peds Bikes	0			0			0			0		
Buses		0	0		0	0				0		0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0				0.0		0.0
Arriv. Type		3	3		3	3				3		3
Unit Ext.		3.0	3.0		3.0	3.0				3.0		3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0		2.0	2.0				2.0		2.0
Ext of g		2.0	2.0		2.0	2.0				2.0		2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	13.8	6.5	0.0		24.2	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1271	720		1087	190				869		963
PHF		0.95	0.95		0.95	0.95				0.95		0.95
Adj flow		1338	758		1144	200				915		1014
No. Lanes	0	2	1	0	3	1	0	0	0		2	0 2
Lane group		T	R		T	R				L		R
Adj flow		1338	758		1144	200				915		1014
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R					L		R
So	1900	1900		1900	1900					1900		1900
Lanes	0 2	1	0	3	1	0	0	0		2	0	2
fW	1.000	1.000		1.000	1.000					1.000		1.000
fHV	0.980	0.980		0.980	0.980					0.980		0.980
fG	1.000	1.000		1.000	1.000					1.000		1.000
fP	1.000	1.000		1.000	1.000					1.000		1.000
fBB	1.000	1.000		1.000	1.000					1.000		1.000
fA	1.000	1.000		1.000	1.000					1.000		1.000
fLU	0.952	1.000		0.908	1.000					0.971		0.885
fRT	1.000	0.850		1.000	0.850							0.850
fLT	1.000			1.000						0.950		
Sec.												
fLpb	1.000			1.000						1.000		
fRpb	1.000	1.000		1.000	1.000							1.000
S	3547	1583		5074	1583					3437		2803
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1338	3547	#	0.38	0.43	1525	0.88
Right	R	758	1583		0.48	1.00	1583	0.48
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1144	5074		0.23	0.43	2182	0.52
Right	R	200	1583		0.13	1.00	1583	0.13
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	915	3437		0.27	0.40	1386	0.66
Prot								
Perm								
Thru								
Right	R	1014	2803	#	0.36	0.40	1131	0.90

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.74
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.89

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.88	0.43	15.7	1.000	1525	0.40	6.1	0.0	21.8	C	14.0	B
R	0.48	1.00	0.0	0.950	1583	0.11	0.2	0.0	0.2	A		
Westbound												
T	0.52	0.43	12.6	1.000	2182	0.13	0.2	0.0	12.8	B	10.9	B
R	0.13	1.00	0.0	0.950	1583	0.11	0.0	0.0	0.0+	A		
Northbound												
Southbound												
L	0.66	0.40	14.6	1.000	1386	0.23	1.2	0.0	15.7	B		

									21.3	C
R	0.90	0.40	16.7	1.000	1131	0.42	9.6	0.0	26.3	C

Intersection delay = 15.8 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm. For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	17.1	15.7	0.00	0.0	0.0	21.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.2
Westbound								
	0.0						0.0	
T	0.0	0.00	17.1	12.6	0.00	0.0	0.0	12.8
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.0+
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
L	0.0	0.00	17.9	14.6	0.00	0.0	0.0	15.7
	0.0						0.0	
R	0.0	0.00	17.9	16.7	0.00	0.0	0.0	26.3

Intersection Delay 15.8 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound		Southbound	
LaneGroup	T	R	T	R			L	R
Init Queue	0.0	0.0	0.0	0.0			0.0	0.0
Flow Rate	702	758	419	200			471	572
So	1900	1900	1900	1900			1900	1900
No.Lanes	0 2	1	0 3	1	0 0	0	2 0	2
SL	1862	1583	1862	1583			1770	1584
LnCapacity	800	1583	801	1583			713	638
Flow Ratio	0.4	0.5	0.2	0.1			0.3	0.4
v/c Ratio	0.88	0.48	0.52	0.13			0.66	0.90
Grn Ratio	0.43	1.00	0.43	1.00			0.40	0.40
I Factor	1.000		1.000				1.000	
AT or PVG	3	3	3	3			3	3
Pltn Ratio	1.00	1.00	1.00	1.00			1.00	1.00
PF2	1.00		1.00				1.00	1.00
Q1	10.7		5.1				6.4	8.9
kB	0.5	0.7	0.5	0.7			0.4	0.4
Q2	2.8	0.7	0.5	0.1			0.8	2.7
Q Average	13.5		5.6				7.2	11.6
Q Spacing	25.0	25.0	25.0	25.0			25.0	25.0
Q Storage	0	0	0	0			0	0
Q S Ratio								
70th Percentile Output:								
fB%	1.2		1.2				1.2	1.2
BOQ	15.8		6.7				8.5	13.6
QSRatio								
85th Percentile Output:								
fB%	1.5		1.5				1.5	1.5
BOQ	20.1		8.7				11.1	17.5
QSRatio								
90th Percentile Output:								
fB%	1.6		1.7				1.7	1.6
BOQ	21.6		9.6				12.1	18.9
QSRatio								
95th Percentile Output:								
fB%	1.8		1.9				1.9	1.8
BOQ	24.0		11.0				13.7	21.1
QSRatio								
98th Percentile Output:								
fB%	2.1		2.3				2.3	2.1
BOQ	27.7		13.3				16.4	24.5
QSRatio								

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 SB Ramps

Inter.: Macarthur at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Macarthur Boulevard

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Volume		1094	1020		1680	830				346		720
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	15.7	8.7	0.0		20.1	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1768	3547	0.65	0.50	12.0	B	6.8	A
R	1583	1583	0.68	1.00	1.2	A		
Westbound								
T	2529	5074	0.70	0.50	12.5	B	8.5	A
R	1583	1583	0.55	1.00	0.4	A		
Northbound								
Southbound								
L	1151	3437	0.32	0.34	15.0	B		
							20.7	C
R	939	2803	0.81	0.34	23.5	C		

Intersection Delay = 10.1 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Macarthur at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030

Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 SB Ramps N/S St: Macarthur Boulevard

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1094	1020		1680	830				346		720
% Heavy Veh		2	2		2	2				2		2
PHF		0.95	0.95		0.95	0.95				0.95		0.95
PK 15 Vol		288	268		442	218				91		189
Hi Ln Vol												
% Grade		0			0						0	
Ideal Sat		1900	1900		1900	1900				1900		1900
ParkExist												
NumPark												
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
LGConfig		T	R		T	R				L		R
Lane Width		12.0	12.0		12.0	12.0				12.0		12.0
RTOR Vol			0			0						0
Adj Flow		1152	1074		1768	874				364		758
%InSharedLn												
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000
Peds Bikes	0			0			0			0		
Buses		0	0		0	0				0		0
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0				0.0		0.0
Arriv. Type		3	3		3	3				3		3
Unit Ext.		3.0	3.0		3.0	3.0				3.0		3.0
I Factor		1.000			1.000						1.000	
Lost Time		2.0	2.0		2.0	2.0				2.0		2.0
Ext of g		2.0	2.0		2.0	2.0				2.0		2.0
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
WB Left					SB Left	A		
Thru	A	A			Thru			
Right	A	A			Right	A		
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right	A		
Green	15.7	8.7	0.0		20.1	0.0		
Yellow	4.0	4.0			3.5			
All Red	1.5	1.5			1.0			

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1094	1020		1680	830				346		720
PHF		0.95	0.95		0.95	0.95				0.95		0.95
Adj flow		1152	1074		1768	874				364		758
No. Lanes	0	2	1	0	3	1	0	0	0	2	0	2
Lane group		T	R		T	R				L		R
Adj flow		1152	1074		1768	874				364		758
Prop LTs		0.000			0.000							
Prop RTs		0.000	1.000		0.000	1.000						1.000

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		T	R					L		R
So	1900	1900		1900	1900					1900		1900
Lanes	0 2	1	0	3	1	0	0	0		2	0	2
fW	1.000	1.000		1.000	1.000					1.000		1.000
fHV	0.980	0.980		0.980	0.980					0.980		0.980
fG	1.000	1.000		1.000	1.000					1.000		1.000
fP	1.000	1.000		1.000	1.000					1.000		1.000
fBB	1.000	1.000		1.000	1.000					1.000		1.000
fA	1.000	1.000		1.000	1.000					1.000		1.000
fLU	0.952	1.000		0.908	1.000					0.971		0.885
fRT	1.000	0.850		1.000	0.850							0.850
fLT	1.000			1.000						0.950		
Sec.												
fLpb	1.000			1.000						1.000		
fRpb	1.000	1.000		1.000	1.000							1.000
S	3547	1583		5074	1583					3437		2803
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1152	3547		0.32	0.50	1768	0.65
Right	R	1074	1583	#	0.68	1.00	1583	0.68
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1768	5074		0.35	0.50	2529	0.70
Right	R	874	1583		0.55	1.00	1583	0.55
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left	L	364	3437		0.11	0.34	1151	0.32
Prot								
Perm								
Thru								
Right	R	758	2803		0.27	0.34	939	0.81

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.68
Total lost time per cycle, L = 0.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.68

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Del Factor k	d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.65	0.50	11.2	1.000	1768	0.23	0.9	0.0	12.0	B	6.8	A
R	0.68	1.00	0.0	0.950	1583	0.25	1.2	0.0	1.2	A		
Westbound												
T	0.70	0.50	11.6	1.000	2529	0.27	0.9	0.0	12.5	B	8.5	A
R	0.55	1.00	0.0	0.950	1583	0.15	0.4	0.0	0.4	A		
Northbound												
Southbound												

L	0.32	0.34	14.8	1.000	1151	0.11	0.2	0.0	15.0	B	
										20.7	C
R	0.81	0.34	18.2	1.000	939	0.35	5.3	0.0	23.5	C	

Intersection delay = 10.1 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.

* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.

** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.

For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C = 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT	0.000	0.000		
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo	0.908	0.952		
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				

EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

		EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v					
v/c ratio from Capacity Worksheet, X					
Protected phase effective green interval, g (s)					
Opposing queue effective green interval, gq					
Unopposed green interval, gu					
Red time r=(C-g-gq-gu)					
Arrival rate, qa=v/(3600(max[X,1.0]))					
Protected ph. departure rate, Sp=s/3600					
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)					
XPerm					
XProt					
Case					
Queue at beginning of green arrow, Qa					
Queue at beginning of unsaturated green, Qu					
Residual queue, Qr					
Uniform Delay, d1					

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

	0.0						0.0	
T	0.0	0.00	15.0	11.2	0.00	0.0	0.0	12.0
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.2
Westbound								
	0.0						0.0	
T	0.0	0.00	15.0	11.6	0.00	0.0	0.0	12.5
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.4
Northbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Southbound								
L	0.0	0.00	19.9	14.8	0.00	0.0	0.0	15.0
	0.0						0.0	
R	0.0	0.00	19.9	18.2	0.00	0.0	0.0	23.5

Intersection Delay 10.1 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound			Southbound		
LaneGroup	T	R	T	R				L		R
Init Queue	0.0	0.0	0.0	0.0				0.0		0.0
Flow Rate	605	1074	649	874				187		428
So	1900	1900	1900	1900				1900		1900
No.Lanes	0 2	1	0 3	1	0	0	0	2	0	2
SL	1862	1583	1862	1583				1770		1584
LnCapacity	928	1583	928	1583				592		530
Flow Ratio	0.3	0.7	0.3	0.6				0.1		0.3
v/c Ratio	0.65	0.68	0.70	0.55				0.32		0.81
Grn Ratio	0.50	1.00	0.50	1.00				0.34		0.34
I Factor	1.000		1.000					1.000		
AT or PVG	3	3	3	3				3		3
Pltn Ratio	1.00	1.00	1.00	1.00				1.00		1.00
PF2	1.00		1.00					1.00		1.00
Q1	7.5		8.3					2.3		6.5
kB	0.5	0.7	0.5	0.7				0.4		0.4
Q2	0.9	1.5	1.2	0.9				0.2		1.4
Q Average	8.4		9.5					2.5		7.9
Q Spacing	25.0	25.0	25.0	25.0				25.0		25.0
Q Storage	0	0	0	0				0		0
Q S Ratio										
70th Percentile Output:										
fB%	1.2		1.2					1.2		1.2
BOQ	10.0		11.2					3.0		9.3
QSRatio										
85th Percentile Output:										
fB%	1.5		1.5					1.6		1.5
BOQ	12.9		14.4					3.9		12.1
QSRatio										
90th Percentile Output:										
fB%	1.7		1.6					1.8		1.7
BOQ	14.0		15.7					4.4		13.2
QSRatio										
95th Percentile Output:										
fB%	1.9		1.9					2.0		1.9
BOQ	15.8		17.6					5.1		14.9
QSRatio										
98th Percentile Output:										
fB%	2.2		2.2					2.5		2.2
BOQ	18.8		20.7					6.3		17.7
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 NB Ramps

Inter.: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Dyer Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	3	1	0	3	1	1	1	1	0	0	0
LGConfig		T	R		TR	R	L	LTR	R			
Volume		2131	550		987	390	813	0	689			
Lane Width		12.0	12.0		12.0	12.0	12.0	12.0	12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru	A			
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right					EB Right	A			
SB Right					WB Right				
Green	33.9	8.3	0.0			48.2	0.0		
Yellow	4.0	4.0				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 105.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	2281	5074	0.98	0.45	43.6	D	34.7	C
R	1583	1583	0.37	1.00	0.1	A		
Westbound								
TR	2281	5074	0.46	0.45	20.2	C	20.9	C
R	712	1583	0.58	0.45	22.7	C		
Northbound								
L	813	1770	1.05	0.46	74.8	E		
LTR	855	1863	0.00	0.46	15.4	B	68.5	E
R	727	1583	1.00	0.46	61.0	E		
Southbound								

Intersection Delay = 40.4 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	AM Peak Hour
Intersection:	Dyer at SR-55 NB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: SR-55 NB Ramps N/S St: Dyer Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		2131	550		987	390	813	0	689			
% Heavy Veh		2	2		2	2	2	2	2			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
PK 15 Vol		561	145		260	103	214	0	181			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900	1900	1900			
ParkExist												
NumPark												
No. Lanes	0	3	1	0	3	1		1	1	1	0	0	0
LGConfig		T	R		TR	R	L		LTR	R			
Lane Width		12.0	12.0		12.0	12.0	12.0	12.0	12.0			
RTOR Vol			0			0			0			
Adj Flow		2243	579		1039	411	856	0	725			
%InSharedLn						0	0		0			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.000	1.000		0.000	1.000			
Peds Bikes	0			0			0			0		
Buses		0	0		0	0	0	0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Arriv. Type		3	3		3	3	3	3	3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0	3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0	2.0	2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0	2.0	2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right			
Green	33.9	8.3	0.0		48.2	0.0		
Yellow	4.0	4.0			3.6			
All Red	1.0	1.0			1.0			

Cycle Length: 105.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		2131	550		987	390	813	0	689			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
Adj flow		2243	579		1039	411	856	0	725			
No. Lanes	0	3	1	0	3	1		1	1	1	0	0	0
Lane group		T	R		TR	R	L		LTR	R			
Adj flow		2243	579		1039	411	856	0	725			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.000	1.000		0.000	1.000			

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		TR	R	L	LTR	R				
So	1900	1900		1900	1900	1900	1900	1900				
Lanes	0 3	1	0	3	1	1	1	1	0	0	0	
fW	1.000	1.000		1.000	1.000	1.000	1.000	1.000				
fHV	0.980	0.980		0.980	0.980	0.980	0.980	0.980				
fG	1.000	1.000		1.000	1.000	1.000	1.000	1.000				
fP	1.000	1.000		1.000	1.000	1.000	1.000	1.000				
fBB	1.000	1.000		1.000	1.000	1.000	1.000	1.000				
fA	1.000	1.000		1.000	1.000	1.000	1.000	1.000				
fLU	0.908	1.000		0.908	1.000	1.000	1.000	1.000				
fRT	1.000	0.850		1.000	0.850		1.000	0.850				
fLT	1.000			1.000		0.950	1.000					
Sec.												
fLpb	1.000			1.000		1.000	1.000					
fRpb	1.000	1.000		1.000	1.000		1.000	1.000				
S	5074	1583		5074	1583	1770	1863	1583				
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	2243	5074	#	0.44	0.45	2281	0.98
Right	R	579	1583		0.37	1.00	1583	0.37
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1039	5074		0.20	0.45	2281	0.46
Right	R	411	1583		0.26	0.45	712	0.58
Northbound								
Prot								
Perm								
Left	L	856	1770	#	0.48	0.46	813	1.05
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.46	855	0.00
Right	R	725	1583		0.46	0.46	727	1.00
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.93
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.02

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.98	0.45	28.5	1.000	2281	0.49	15.1	0.0	43.6	D	34.7	C
R	0.37	1.00	0.0	0.950	1583	0.11	0.1	0.0	0.1	A		
Westbound												
TR	0.46	0.45	20.0	1.000	2281	0.11	0.1	0.0	20.2	C	20.9	C
R	0.58	0.45	21.5	1.000	712	0.17	1.2	0.0	22.7	C		
Northbound												
L	1.05	0.46	28.4	1.000	813	0.50	46.4	0.0	74.8	E		
LTR	0.00	0.46	15.4	1.000	855	0.11	0.0	0.0	15.4	B	68.5	E
R	1.00	0.46	28.3	1.000	727	0.50	32.6	0.0	61.0	E		
Southbound												

Intersection delay = 40.4 (sec/veh) Intersection LOS = D

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	105.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)					
or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	105.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	105.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	

T	0.0	0.00	28.9	28.5	0.00	0.0	0.0	43.6
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	0.1
Westbound								
	0.0						0.0	
TR	0.0	0.00	28.9	20.0	0.00	0.0	0.0	20.2
R	0.0	0.00	28.9	21.5	0.00	0.0	0.0	22.7
Northbound								
L	0.0	0.00	28.4	28.4	0.00	10.8	0.0	74.8
LTR	0.0	0.00	28.4	15.4	0.00	0.0	0.0	15.4
R	0.0	0.00	28.4	28.3	0.00	0.0	0.0	61.0
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 40.4 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound		Westbound		Northbound			Southbound		
LaneGroup	T	R	TR	R	L	LTR	R			
Init Queue	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Flow Rate	823	579	381	411	856	0	725			
So	1900	1900	1900	1900	1900	1900	1900			
No.Lanes	0 3	1	0 3	1	1	1	1	0	0	0
SL	1862	1583	1862	1583	1770	1863	1583			
LnCapacity	837	1583	837	712	813	855	727			
Flow Ratio	0.4	0.4	0.2	0.3	0.5	0.0	0.5			
v/c Ratio	0.98	0.37	0.46	0.58	1.05	0.00	1.00			
Grn Ratio	0.45	1.00	0.45	0.45	0.46	0.46	0.46			
I Factor	1.000		1.000			1.000				
AT or PVG	3	3	3	3	3	3	3			
Pltn Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
PF2	1.00		1.00	1.00	1.00	1.00	1.00			
Q1	23.7		7.7	8.9	25.0	0.0	21.1			
kB	0.7	1.0	0.7	0.6	0.7	0.7	0.6			
Q2	7.5	0.6	0.6	0.8	11.6	0.0	7.4			
Q Average	31.2		8.3	9.7	36.5	0.0	28.5			
Q Spacing	25.0	25.0	25.0	25.0	25.0	25.0	25.0			
Q Storage	0	0	0	0	0	0	0			
Q S Ratio										
70th Percentile Output:										
fB%	1.1		1.2	1.2	1.1	1.2	1.1			
BOQ	35.8		9.8	11.5	41.6	0.0	32.7			
QSRatio										
85th Percentile Output:										
fB%	1.4		1.5	1.5	1.4	1.6	1.4			
BOQ	43.9		12.6	14.8	50.7	0.0	40.4			
QSRatio										
90th Percentile Output:										
fB%	1.5		1.7	1.6	1.5	1.8	1.5			
BOQ	46.3		13.7	16.0	53.5	0.0	42.6			
QSRatio										
95th Percentile Output:										
fB%	1.6		1.9	1.8	1.6	2.1	1.6			
BOQ	50.1		15.5	18.0	57.7	0.0	46.3			
QSRatio										
98th Percentile Output:										
fB%	1.8		2.2	2.2	1.8	2.7	1.8			
BOQ	55.9		18.4	21.2	64.3	0.0	51.6			
QSRatio										

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 NB Ramps

Inter.: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Dyer Road

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	3	1	0	3	1	1	1	1	0	0	0
LGConfig		T	R		TR	R	L		LTR R			
Volume		1020	1020		1618	1280	232	0	80			
Lane Width		12.0	12.0		12.0	12.0	12.0	12.0	12.0			
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	A			
Thru	A	A			Thru	A			
Right	A	A			Right	A			
Peds					Peds				
WB Left					SB Left				
Thru	A	A			Thru				
Right	A	A			Right				
Peds					Peds				
NB Right					EB Right	A			
SB Right					WB Right				
Green	92.9	5.9	0.0			16.6	0.0		
Yellow	4.0	4.0				3.6			
All Red	1.0	1.0				1.0			

Cycle Length: 130.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	4051	5074	0.27	0.80	3.4	A	2.3	A
R	1583	1583	0.68	1.00	1.2	A		
Westbound								
TR	4051	5074	0.42	0.80	4.0	A	27.8	C
R	1264	1583	1.07	0.80	57.9	E		
Northbound								
L	226	1770	1.08	0.13	139.4	F		
LTR	238	1863	0.00	0.13	49.5	D	117.4	F
R	202	1583	0.42	0.13	53.6	D		
Southbound								

Intersection Delay = 23.2 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB

Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: PM Peak Hour
Intersection: Dyer at SR-55 NB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 NB Ramps N/S St: Dyer Road

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume		1020	1020		1618	1280	232	0	80			
% Heavy Veh		2	2		2	2	2	2	2			
PHF		0.95	0.95		0.95	0.95	0.95	0.95	0.95			
PK 15 Vol		268	268		426	337	61	0	21			
Hi Ln Vol												
% Grade		0			0			0				
Ideal Sat		1900	1900		1900	1900	1900	1900	1900			
ParkExist												
NumPark												
No. Lanes	0	3	1	0	3	1		1	1	1	0	0	0
LGConfig		T	R		TR	R	L		LTR	R			
Lane Width		12.0	12.0		12.0	12.0	12.0	12.0	12.0			
RTOR Vol		0			0			0				
Adj Flow		1074	1074		1703	1347	244	0	84			
%InSharedLn					0		0		0			
Prop LTs		0.000			0.000			0.000				
Prop RTs		0.000	1.000		0.000	1.000		0.000	1.000			
Peds Bikes		0			0			0			0	
Buses		0	0		0	0	0	0	0			
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0	0.0		0.0	0.0	0.0	0.0	0.0			
Arriv. Type		3	3		3	3	3	3	3			
Unit Ext.		3.0	3.0		3.0	3.0	3.0	3.0	3.0			
I Factor		1.000			1.000			1.000				
Lost Time		2.0	2.0		2.0	2.0	2.0	2.0	2.0			
Ext of g		2.0	2.0		2.0	2.0	2.0	2.0	2.0			
Ped Min g		3.2			3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left	A		
Thru	A	A			Thru	A		
Right	A	A			Right	A		
Peds					Peds			
WB Left					SB Left			
Thru	A	A			Thru			
Right	A	A			Right			
Peds					Peds			
NB Right					EB Right	A		
SB Right					WB Right			
Green	92.9	5.9	0.0			16.6	0.0	
Yellow	4.0	4.0				3.6		
All Red	1.0	1.0				1.0		

Cycle Length: 130.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V		1020	1020		1618	1280	232	0	80			

PHF		0.95	0.95		0.95	0.95		0.95	0.95	0.95									
Adj flow		1074	1074		1703	1347		244	0	84									
No. Lanes		0	3	1		0	3	1		1	1	1		0	0	0			
Lane group			T	R			TR	R		L		LTR	R						
Adj flow		1074	1074		1703	1347		244	0	84									
Prop LTs		0.000			0.000			0.000											
Prop RTs		0.000	1.000		0.000	1.000		0.000	1.000										

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	T	R		TR	R		L	LTR	R			
So	1900	1900		1900	1900		1900	1900	1900			
Lanes	0	3	1	0	3	1	1	1	1	0	0	0
fW	1.000	1.000		1.000	1.000		1.000	1.000	1.000			
fHV	0.980	0.980		0.980	0.980		0.980	0.980	0.980			
fG	1.000	1.000		1.000	1.000		1.000	1.000	1.000			
fP	1.000	1.000		1.000	1.000		1.000	1.000	1.000			
fBB	1.000	1.000		1.000	1.000		1.000	1.000	1.000			
fA	1.000	1.000		1.000	1.000		1.000	1.000	1.000			
fLU	0.908	1.000		0.908	1.000		1.000	1.000	1.000			
fRT	1.000	0.850		1.000	0.850			1.000	0.850			
fLT	1.000			1.000			0.950	1.000				
Sec.												
fLpb	1.000			1.000			1.000	1.000				
fRpb	1.000	1.000		1.000	1.000			1.000	1.000			
S	5074	1583		5074	1583		1770	1863	1583			
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	1074	5074		0.21	0.80	4051	0.27
Right	R	1074	1583		0.68	1.00	1583	0.68
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	1703	5074		0.34	0.80	4051	0.42
Right	R	1347	1583	#	0.85	0.80	1264	1.07
Northbound								
Prot								
Perm								
Left	L	244	1770	#	0.14	0.13	226	1.08
Prot								
Perm								
Thru	LTR	0	1863		0.00	0.13	238	0.00
Right	R	84	1583		0.05	0.13	202	0.42
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.99
Total lost time per cycle, L = 9.60 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.07

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
T	0.27	0.80	3.3	1.000	4051	0.11	0.0	0.0	3.4	A	2.3	A
R	0.68	1.00	0.0	0.950	1583	0.25	1.2	0.0	1.2	A		
Westbound												

TR	0.42	0.80	4.0	1.000	4051	0.11	0.1	0.0	4.0	A	27.8	C
R	1.07	0.80	13.1	1.000	1264	0.50	44.8	0.0	57.9	E		
Northbound												
L	1.08	0.13	56.7	1.000	226	0.50	82.7	0.0	139.4	F		
LTR	0.00	0.13	49.5	1.000	238	0.11	0.0	0.0	49.5	D	117.4	F
R	0.42	0.13	52.2	1.000	202	0.11	1.4	0.0	53.6	D		
Southbound												

Intersection delay = 23.2 (sec/veh) Intersection LOS = C

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	130.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	130.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT		0.000	0.000	0.000	
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo		0.908	0.908		1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					

Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 130.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
T	0.0	0.00	13.1	3.3	0.00	0.0	0.0	3.4
R	0.0	0.00	0.0	0.0	0.00	0.0	0.0	1.2
Westbound								
	0.0						0.0	
TR	0.0	0.00	13.1	4.0	0.00	0.0	0.0	4.0
R	0.0	0.00	13.1	13.1	0.00	20.7	0.0	57.9
Northbound								
L	0.0	0.00	56.7	56.7	0.00	4.5	0.0	139.4
LTR	0.0	0.00	56.7	49.5	0.00	0.0	0.0	49.5
R	0.0	0.00	56.7	52.2	0.00	0.0	0.0	53.6
Southbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	

Intersection Delay 23.2 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound			Southbound		
LaneGroup		T	R		TR	R	L	LTR	R		
Init Queue		0.0	0.0		0.0	0.0	0.0	0.0	0.0		
Flow Rate		394	1074		625	1347	244	0	84		
So		1900	1900		1900	1900	1900	1900	1900		
No.Lanes	0	3	1	0	3	1	1	1	1	0	0 0
SL		1862	1583		1862	1583	1770	1863	1583		
LnCapacity		1487	1583		1487	1264	226	238	202		
Flow Ratio		0.2	0.7		0.3	0.9	0.1	0.0	0.1		
v/c Ratio		0.26	0.68		0.42	1.07	1.08	0.00	0.42		
Grn Ratio		0.80	1.00		0.80	0.80	0.13	0.13	0.13		
I Factor		1.000			1.000			1.000			
AT or PVG		3	3		3	3	3	3	3		
Pltn Ratio		1.00	1.00		1.00	1.00	1.00	1.00	1.00		
PF2		1.00			1.00	1.00	1.00	1.00	1.00		
Q1		3.6			6.8	48.6	8.8	0.0	2.8		
kB		1.1	1.1		1.1	1.0	0.4	0.4	0.3		
Q2		0.4	2.3		0.8	19.1	4.6	0.0	0.2		
Q Average		4.0			7.6	67.7	13.4	0.0	3.0		
Q Spacing		25.0	25.0		25.0	25.0	25.0	25.0	25.0		
Q Storage		0	0		0	0	0	0	0		
Q S Ratio											
70th Percentile Output:											
fB%		1.2			1.2	1.1	1.2	1.2	1.2		
BOQ		4.8			9.0	75.8	15.7	0.0	3.6		
QSRatio											
85th Percentile Output:											
fB%		1.6			1.5	1.3	1.5	1.6	1.6		
BOQ		6.3			11.7	90.2	20.0	0.0	4.8		
QSRatio											
90th Percentile Output:											
fB%		1.7			1.7	1.4	1.6	1.8	1.7		
BOQ		7.0			12.8	95.8	21.5	0.0	5.3		
QSRatio											
95th Percentile Output:											
fB%		2.0			1.9	1.5	1.8	2.1	2.0		
BOQ		8.0			14.4	103	23.9	0.0	6.1		
QSRatio											
98th Percentile Output:											
fB%		2.4			2.3	1.7	2.1	2.7	2.5		
BOQ		9.8			17.2	116	27.6	0.0	7.5		
QSRatio											

ERROR MESSAGES

No errors to report.

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: AM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 SB Ramps

Inter.: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Grand Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Volume				410		339		948			573	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		21.8	0.0			7.0	15.7	0.0
Yellow		3.6				4.0	4.0	
All Red		1.0				1.0	1.9	

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	643	1770	0.67	0.36	18.8	B		
							18.4	B
R	575	1583	0.62	0.36	17.8	B		
Northbound								
T	1638	3547	0.61	0.46	12.8	B	12.8	B
Southbound								
T	2342	5074	0.26	0.46	9.9	A	9.9	A

Intersection Delay = 13.9 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: PB
Agency/Co.: Parsons Brinckerhoff
Date Performed: 11/19/09
Analysis Time Period: AM Peak Hour
Intersection: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisdiction: Caltrans
Analysis Year: P2030
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 SB Ramps N/S St: Grand Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				410	339			948			573	
% Heavy Veh				2	2			2			2	
PHF				0.95	0.95			0.95			0.95	
PK 15 Vol				108	89			249			151	
Hi Ln Vol												
% Grade				0				0			0	
Ideal Sat				1900	1900			1900			1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Lane Width				12.0	12.0			12.0			12.0	
RTOR Vol					0							
Adj Flow				432	357			998			603	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs					1.000		0.000			0.000		
Peds Bikes	0			0								
Buses				0	0			0			0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0	0.0			0.0			0.0	
Arriv. Type				3	3			3			3	
Unit Ext.				3.0	3.0			3.0			3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0	2.0			2.0			2.0	
Ext of g				2.0	2.0			2.0			2.0	
Ped Min g		3.2			3.2							

PHASE DATA

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left				
Thru					Thru	A	A		
Right					Right				
Peds					Peds				
WB Left	A				SB Left				
Thru					Thru	A	A		
Right	A				Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	21.8	0.0				7.0	15.7	0.0	
Yellow	3.6					4.0	4.0		
All Red	1.0					1.0	1.9		

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				410	339		948			573		
PHF				0.95	0.95		0.95			0.95		
Adj flow				432	357		998			603		
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
Lane group				L		R		T			T	
Adj flow				432	357		998			603		
Prop LTs							0.000			0.000		
Prop RTs					1.000		0.000			0.000		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)

	Eastbound			Westbound			Northbound			Southbound		
LG			L			R			T			T
So			1900			1900			1900			1900
Lanes	0	0	1	0		1	0		2	0	0	3	0
fW			1.000			1.000			1.000			1.000
fHV			0.980			0.980			0.980			0.980
fG			1.000			1.000			1.000			1.000
fP			1.000			1.000			1.000			1.000
fBB			1.000			1.000			1.000			1.000
fA			1.000			1.000			1.000			1.000
fLU			1.000			1.000			0.952			0.908
fRT						0.850			1.000			1.000
fLT			0.950						1.000			1.000
Sec.												
fLpb			1.000						1.000			1.000
fRpb						1.000			1.000			1.000
S			1770			1583			3547			5074
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	432	1770	#	0.24	0.36	643	0.67
Prot								
Perm								
Thru								
Right	R	357	1583		0.23	0.36	575	0.62
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	998	3547	#	0.28	0.46	1638	0.61
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	603	5074		0.12	0.46	2342	0.26
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.53
Total lost time per cycle, L = 10.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.64

Control Delay and LOS Determination

Appr/ Lane	Ratios	Unf Del	Prog Adj	Lane Grp	Incremental Factor	Del	Res Del	Lane Group	Approach

Grp	v/c	g/C	d1	Fact	Cap	k	d2	d3	Delay	LOS	Delay	LOS
Eastbound												
Westbound												
L	0.67	0.36	16.1	1.000	643	0.24	2.7	0.0	18.8	B		
											18.4	B
R	0.62	0.36	15.7	1.000	575	0.20	2.1	0.0	17.8	B		
Northbound												
T	0.61	0.46	12.1	1.000	1638	0.20	0.7	0.0	12.8	B	12.8	B
Southbound												
T	0.26	0.46	9.9	1.000	2342	0.11	0.1	0.0	9.9	A	9.9	A

Intersection delay = 13.9 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT					
Proportion of LT in opposing flow, PLTo					
Adjusted opposing flow rate, Vo (veh/h)					
Lost time for LT lane group, tL					
Computation					
LT volume per cycle, LTC=VLTC/3600					
Opposing lane util. factor, fLUo				0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)					
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g					
Opposing platoon ratio, Rpo (refer Exhibit 16-11)					
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]					
gq, (see Exhibit C16-4,5,6,7,8)					
gu=g-gq if gq>=gf, or = g-gf if gq<gf					
n=Max(gq-gf)/2,0)					
PTHo=1-PLTo					
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]					
EL1 (refer to Exhibit C16-3)					
EL2=Max((1-Ptho**n)/Plto, 1.0)					
fmin=2(1+PL)/g or fmin=2(1+Pl)/g					
gdiff=max(gq-gf,0)					
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)					
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**					
Left-turn adjustment, fLT					

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input		EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach					
Cycle length, C	60.0 sec				
Total actual green time for LT lane group, G (s)					
Effective permitted green time for LT lane group, g(s)					
Opposing effective green time, go (s)					
Number of lanes in LT lane group, N					
Number of lanes in opposing approach, No					
Adjusted LT flow rate, VLT (veh/h)					
Proportion of LT in LT lane group, PLT				0.000	0.000

Proportion of LT in opposing flow, PLTo
Adjusted opposing flow rate, Vo (veh/h)
Lost time for LT lane group, tL
Computation
LT volume per cycle, LTC=VLTC/3600
Opposing lane util. factor, fLUo 0.908 0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g
Opposing platoon ratio, Rpo (refer Exhibit 16-11)
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]
gq, (see Exhibit C16-4,5,6,7,8)
gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C 60.0 sec				
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				

XPerm
XProt
Case
Queue at beginning of green arrow, Qa
Queue at beginning of unsaturated green, Qu
Residual queue, Qr
Uniform Delay, d1

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.1	16.1	0.00	0.0	0.0	18.8
	0.0						0.0	
R	0.0	0.00	19.1	15.7	0.00	0.0	0.0	17.8
Northbound								
	0.0						0.0	
T	0.0	0.00	16.2	12.1	0.00	0.0	0.0	12.8
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	16.2	9.9	0.00	0.0	0.0	9.9
	0.0						0.0	

Intersection Delay 13.9 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound			Westbound		Northbound			Southbound		
LaneGroup				L	R	T			T		
Init Queue				0.0	0.0	0.0			0.0		
Flow Rate				432	357	524			221		
So				1900	1900	1900			1900		
No.Lanes	0	0	0	1	0 1	0	2	0	0	3	0
SL				1770	1583	1862			1862		
LnCapacity				643	575	860			859		
Flow Ratio				0.2	0.2	0.3			0.1		
v/c Ratio				0.67	0.62	0.61			0.26		
Grn Ratio				0.36	0.36	0.46			0.46		
I Factor				1.000		1.000			1.000		
AT or PVG				3	3	3			3		
Pltn Ratio				1.00	1.00	1.00			1.00		
PF2				1.00	1.00	1.00			1.00		
Q1				6.1	4.9	6.5			2.3		
kB				0.4	0.4	0.5			0.5		
Q2				0.8	0.6	0.8			0.2		
Q Average				6.9	5.5	7.3			2.4		
Q Spacing				25.0	25.0	25.0			25.0		
Q Storage				0	0	0			0		
Q S Ratio											
70th Percentile Output:											
fB%				1.2	1.2	1.2			1.2		
BOQ				8.2	6.5	8.6			2.9		
QSRatio											
85th Percentile Output:											
fB%				1.5	1.5	1.5			1.6		
BOQ				10.6	8.5	11.2			3.8		
QSRatio											
90th Percentile Output:											
fB%				1.7	1.7	1.7			1.8		
BOQ				11.6	9.4	12.2			4.2		
QSRatio											
95th Percentile Output:											
fB%				1.9	1.9	1.9			2.0		
BOQ				13.2	10.7	13.9			4.9		
QSRatio											
98th Percentile Output:											
fB%				2.3	2.4	2.3			2.5		
BOQ				15.8	13.0	16.6			6.1		
QSRatio											

HCS+: Signalized Intersections Release 5.4

Analyst: PB
Agency: Parsons Brinckerhoff
Date: 11/19/09
Period: PM Peak Hour
Project ID: IBC Vision Traffic Study - Cumulative With Project (MPAH)
E/W St: SR-55 SB Ramps

Inter.: Grand at SR-55 SB Ramps
Area Type: All other areas
Jurisd: Caltrans
Year : P2030
N/S St: Grand Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Volume				339		231		758			711	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left	A				SB Left			
Thru					Thru	A	A	
Right	A				Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	21.3	0.0			12.0	11.2	0.0	
Yellow	3.6				4.0	4.0		
All Red	1.0				1.0	1.9		

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound								
Westbound								
L	628	1770	0.57	0.35	16.9	B		
							16.2	B
R	562	1583	0.43	0.35	15.3	B		
Northbound								
T	1667	3547	0.48	0.47	11.1	B	11.1	B
Southbound								
T	2385	5074	0.31	0.47	10.0-	A	10.0-	A

Intersection Delay = 12.1 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.4

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst:	PB
Agency/Co.:	Parsons Brinckerhoff
Date Performed:	11/19/09
Analysis Time Period:	PM Peak Hour
Intersection:	Grand at SR-55 SB Ramps
Area Type:	All other areas
Jurisdiction:	Caltrans
Analysis Year:	P2030
Project ID:	IBC Vision Traffic Study - Cumulative With Project (MPAH)

E/W St: SR-55 SB Ramps N/S St: Grand Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume				339		231		758			711	
% Heavy Veh				2		2		2			2	
PHF				0.95		0.95		0.95			0.95	
PK 15 Vol				89		61		199			187	
Hi Ln Vol												
% Grade					0			0			0	
Ideal Sat				1900		1900		1900			1900	
ParkExist												
NumPark												
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
LGConfig				L		R		T			T	
Lane Width				12.0		12.0		12.0			12.0	
RTOR Vol						0						
Adj Flow				357		243		798			748	
%InSharedLn												
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	
Peds Bikes	0			0								
Buses				0		0		0			0	
%InProtPhase												

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet				0.0		0.0		0.0			0.0	
Arriv. Type				3		3		3			3	
Unit Ext.				3.0		3.0		3.0			3.0	
I Factor					1.000			1.000			1.000	
Lost Time				2.0		2.0		2.0			2.0	
Ext of g				2.0		2.0		2.0			2.0	
Ped Min g		3.2			3.2							

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left					NB Left			
Thru					Thru	A	A	
Right					Right			
Peds					Peds			
WB Left		A			SB Left			
Thru					Thru	A	A	
Right		A			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green		21.3	0.0			12.0	11.2	0.0
Yellow		3.6				4.0	4.0	
All Red		1.0				1.0	1.9	

Cycle Length: 60.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V				339		231		758			711	
PHF				0.95		0.95		0.95			0.95	
Adj flow				357		243		798			748	
No. Lanes	0	0	0	1	0	1	0	2	0	0	3	0
Lane group				L		R		T			T	
Adj flow				357		243		798			748	
Prop LTs								0.000			0.000	
Prop RTs						1.000		0.000			0.000	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG			L		R		T			T		
So			1900		1900		1900			1900		
Lanes	0	0	1	0	1	0	2	0	0	3	0	
fW			1.000		1.000		1.000			1.000		
fHV			0.980		0.980		0.980			0.980		
fG			1.000		1.000		1.000			1.000		
fP			1.000		1.000		1.000			1.000		
fBB			1.000		1.000		1.000			1.000		
fA			1.000		1.000		1.000			1.000		
fLU			1.000		1.000		0.952			0.908		
fRT					0.850		1.000			1.000		
fLT			0.950				1.000			1.000		
Sec.												
fLpb			1.000				1.000			1.000		
fRpb					1.000		1.000			1.000		
S			1770		1583		3547			5074		
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)		Flow Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Westbound								
Prot								
Perm								
Left	L	357	1770	#	0.20	0.35	628	0.57
Prot								
Perm								
Thru								
Right	R	243	1583		0.15	0.35	562	0.43
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	798	3547	#	0.22	0.47	1667	0.48
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	T	748	5074		0.15	0.47	2385	0.31
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.43
Total lost time per cycle, L = 10.50 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.52

Control Delay and LOS Determination_____

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Del d2	Res Del d3	Lane Group Delay	LOS	Approach Delay	LOS
Eastbound												
Westbound												
L	0.57	0.35	15.6	1.000	628	0.16	1.2	0.0	16.9	B		
											16.2	B
R	0.43	0.35	14.7	1.000	562	0.11	0.5	0.0	15.3	B		
Northbound												
T	0.48	0.47	10.9	1.000	1667	0.11	0.2	0.0	11.1	B	11.1	B
Southbound												

T 0.31 0.47 9.9 1.000 2385 0.11 0.1 0.0 10.0- A 10.0- A

Intersection delay = 12.1 (sec/veh) Intersection LOS = B

SUPPLEMENTAL PERMITTED LT WORKSHEET
for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				
EL2=Max((1-Ptho**n)/Plto, 1.0)				
fmin=2(1+PL)/g or fmin=2(1+Pl)/g				
gdiff=max(gq-gf,0)				
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)				
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00) or flt=[fm+0.91(N-1)]/N**				
Left-turn adjustment, fLT				

For special case of single-lane approach opposed by multilane approach, see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach or when gf>gq, see text.

SUPPLEMENTAL PERMITTED LT WORKSHEET
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C 60.0 sec				
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT			0.000	0.000
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo			0.908	0.952
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				
gu=g-gq if gq>=gf, or = g-gf if gq<gf				
n=Max(gq-gf)/2,0)				
PTHo=1-PLTo				
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]				
EL1 (refer to Exhibit C16-3)				

EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
  left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____

Permitted Left Turns	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				
OCCbicg				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion right-turns, PRT				
Proportion right-turns using protected phase, PRTA				
Right turn adjustment, fRpb				

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

			EBLT	WBLT	NBLT	SBLT
Cycle length, C	60.0	sec				
Adj. LT vol from Vol Adjustment Worksheet, v						
v/c ratio from Capacity Worksheet, X						
Protected phase effective green interval, g (s)						
Opposing queue effective green interval, gq						
Unopposed green interval, gu						
Red time r=(C-g-gq-gu)						
Arrival rate, qa=v/(3600(max[X,1.0]))						
Protected ph. departure rate, Sp=s/3600						
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)						
XPerm						
XProt						
Case						
Queue at beginning of green arrow, Qa						
Queue at beginning of unsaturated green, Qu						
Residual queue, Qr						
Uniform Delay, d1						

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Unmet Demand Q veh	Dur. Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								

	0.0						0.0	
	0.0						0.0	
	0.0						0.0	
Westbound								
L	0.0	0.00	19.4	15.6	0.00	0.0	0.0	16.9
	0.0						0.0	
R	0.0	0.00	19.4	14.7	0.00	0.0	0.0	15.3
Northbound								
	0.0						0.0	
T	0.0	0.00	15.9	10.9	0.00	0.0	0.0	11.1
	0.0						0.0	
Southbound								
	0.0						0.0	
T	0.0	0.00	15.9	9.9	0.00	0.0	0.0	10.0-
	0.0						0.0	

Intersection Delay 12.1 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound		Northbound	Southbound
LaneGroup		L	R	T	T
Init Queue		0.0	0.0	0.0	0.0
Flow Rate		357	243	419	274
So		1900	1900	1900	1900
No.Lanes	0 0 0	1 0	1	0 2 0	0 3 0
SL		1770	1583	1862	1862
LnCapacity		628	562	875	875
Flow Ratio		0.2	0.2	0.2	0.1
v/c Ratio		0.57	0.43	0.48	0.31
Grn Ratio		0.35	0.35	0.47	0.47
I Factor		1.000		1.000	1.000
AT or PVG		3	3	3	3
Pltn Ratio		1.00	1.00	1.00	1.00
PF2		1.00	1.00	1.00	1.00
Q1		4.8	3.1	4.8	2.8
kB		0.4	0.4	0.5	0.5
Q2		0.5	0.3	0.5	0.2
Q Average		5.3	3.4	5.2	3.1
Q Spacing		25.0	25.0	25.0	25.0
Q Storage		0	0	0	0
Q S Ratio					
70th Percentile Output:					
fB%		1.2	1.2	1.2	1.2
BOQ		6.3	4.0	6.2	3.7
QSRatio					
85th Percentile Output:					
fB%		1.6	1.6	1.6	1.6
BOQ		8.3	5.3	8.1	4.8
QSRatio					
90th Percentile Output:					
fB%		1.7	1.7	1.7	1.7
BOQ		9.1	5.9	8.9	5.3
QSRatio					
95th Percentile Output:					
fB%		1.9	2.0	1.9	2.0
BOQ		10.4	6.7	10.2	6.1
QSRatio					
98th Percentile Output:					
fB%		2.4	2.5	2.4	2.5
BOQ		12.6	8.3	12.4	7.6
QSRatio					

ERROR MESSAGES

No errors to report.

Appendix J Land Use Quantities by IBC TAZ (All Scenarios)

IBC Vision Land Use Comparison

Scenario	Multi-family Residential (DU)	Retail mix (TSF)	Hotel (Room)	Office mix (TSF)	Industrial Mix (TSF)	Mini-Warehouse (TSF)	Extended Stay Hotel (Room)
2008 No Project	5,011	1,341	2,322	26,381	14,701	348	174
2008 With Project	17,038	1,731	2,880	33,716	13,180	164	598
2015 Cumulative Baseline No Project	5,011	1,341	2,322	26,381	14,701	348	174
2015 Cumulative Baseline With Project	10,929	1,482	2,572	27,810	14,196	348	598
Post-2030 Cumulative Baseline No Project	5,011	1,341	2,322	26,381	14,701	348	174
Post-2030 Cumulative Baseline With Project	17,038	1,731	2,880	33,716	13,180	164	598
Post-2030 Existing General Plan	9,455	1,637	2,630	36,034	14,724	450	476

2008 No Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	235	236	237	238	239	240	241
395	0.000	0.000	0.000	41.978	357.706	0.000	0.000
396	0.000	0.000	0.000	184.047	408.746	0.000	0.000
397	0.000	22.109	0.000	45.714	243.813	0.000	0.000
398	0.000	12.052	0.000	61.261	168.382	0.000	0.000
399	0.000	0.000	0.000	105.472	289.499	0.000	0.000
400	0.000	0.000	0.000	102.302	551.910	0.000	0.000
401	0.000	0.000	0.000	107.598	231.849	0.000	0.000
402	0.000	0.000	0.000	79.916	136.185	0.000	0.000
403	0.000	237.693	0.000	0.000	18.610	0.000	0.000
404	0.000	0.000	0.000	128.862	155.119	0.000	0.000
405	0.000	0.000	0.000	133.676	224.252	0.000	0.000
406	0.000	0.000	0.000	9.886	129.081	0.000	0.000
407	0.000	0.000	0.000	22.256	117.130	0.000	0.000
408	0.000	0.910	0.000	169.381	132.687	0.000	0.000
409	0.000	0.000	0.000	222.870	156.347	0.000	0.000
410	0.000	0.000	0.000	24.143	143.356	0.000	0.000
411	192.000	5.000	0.000	70.655	345.651	0.000	0.000
412	0.000	0.000	0.000	48.906	120.728	0.000	0.000
413	0.000	0.000	0.000	100.768	251.333	0.000	0.000
414	0.000	4.330	0.000	231.479	319.852	0.000	0.000
415	0.000	0.000	0.000	54.534	70.180	0.000	0.000
416	0.000	4.000	0.000	68.684	159.864	0.000	0.000
417	0.000	0.000	0.000	139.669	13.986	0.000	0.000
418	0.000	0.000	0.000	130.998	158.835	0.000	0.000
419	0.000	0.000	0.000	0.708	69.440	0.000	0.000
420	0.000	0.000	0.000	117.585	280.974	0.000	0.000
421	0.000	0.000	0.000	130.183	118.674	0.000	0.000
422	1.000	0.000	0.000	25.673	196.378	64.280	0.000
423	0.000	0.000	0.000	160.783	0.000	0.000	0.000
424	0.000	0.000	0.000	76.103	158.715	0.000	0.000
425	0.000	0.000	0.000	300.700	0.000	0.000	0.000
426	0.000	1.760	0.000	301.550	79.691	0.000	0.000
427	0.000	0.000	0.000	55.503	59.674	0.000	0.000
428	0.000	1.902	0.000	62.777	175.770	0.000	0.000
429	0.000	0.000	0.000	139.005	199.456	0.000	0.000
430	0.000	0.000	0.000	437.938	166.265	0.000	0.000
431	0.000	1.930	0.000	84.263	278.240	0.000	0.000
432	0.000	0.000	0.000	71.072	43.919	0.000	0.000
433	0.000	0.000	0.000	30.004	157.309	0.000	0.000
434	0.000	0.000	0.000	103.377	146.061	0.000	0.000
435	0.000	0.000	0.000	19.717	67.700	0.000	0.000
436	0.000	0.000	0.000	170.122	75.073	0.000	0.000
437	0.000	0.600	0.000	120.180	45.696	0.000	0.000
438	0.000	0.000	0.000	138.019	262.960	0.000	0.000
439	0.000	0.000	0.000	228.554	384.005	0.000	0.000
440	0.000	0.000	0.000	10.270	192.220	0.000	0.000
441	0.000	30.965	0.000	117.389	187.637	0.000	0.000
442	0.000	0.000	0.000	19.602	92.070	0.000	0.000
443	0.000	20.562	0.000	63.768	6.094	0.000	0.000
444	0.000	0.000	0.000	35.263	26.561	0.000	0.000
445	0.000	0.000	0.000	46.750	128.372	0.000	0.000
446	0.000	0.000	0.000	80.516	249.836	0.000	0.000
447	0.000	3.724	0.000	27.623	117.983	0.000	0.000
448	0.000	13.900	0.000	106.519	30.581	0.000	0.000
449	0.000	0.000	0.000	60.097	196.890	0.000	0.000
450	0.000	0.000	0.000	16.690	126.562	0.000	0.000

2008 No Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	235	236	237	238	239	240	241
451	0.000	0.000	0.000	92.560	2.748	0.000	0.000
452	0.000	4.558	0.000	264.845	11.091	0.000	0.000
453	0.000	0.000	0.000	267.267	2.024	0.000	0.000
454	0.000	0.000	0.000	129.400	0.000	0.000	0.000
455	0.000	0.000	0.000	62.455	112.164	0.000	0.000
456	0.000	86.441	0.000	119.414	597.674	0.000	0.000
457	0.000	0.000	0.000	78.119	136.941	0.000	0.000
458	0.000	0.000	0.000	84.398	50.841	0.000	0.000
459	0.000	4.880	0.000	414.001	42.088	0.000	0.000
460	0.000	0.000	0.000	43.782	127.119	0.000	0.000
461	0.000	0.000	0.000	32.083	184.693	0.000	0.000
462	0.000	0.000	0.000	81.131	340.969	0.000	0.000
463	0.000	0.000	0.000	36.731	40.681	0.000	0.000
464	178.000	0.000	0.000	101.520	67.994	0.000	0.000
465	0.000	0.000	0.000	35.778	105.962	0.000	0.000
466	0.000	7.968	0.000	36.475	12.800	0.000	0.000
467	0.000	0.000	0.000	212.570	0.000	0.000	0.000
468	0.000	0.000	0.000	45.507	203.336	0.000	0.000
469	0.000	0.000	0.000	143.425	12.000	0.000	0.000
470	0.000	62.988	0.000	133.122	78.386	0.000	0.000
471	0.000	2.669	0.000	278.460	158.741	0.000	0.000
472	0.000	0.000	0.000	18.192	52.712	0.000	0.000
473	0.000	0.000	0.000	82.075	132.188	0.000	0.000
474	0.000	0.000	0.000	133.909	353.186	0.000	0.000
475	0.000	27.134	0.000	3.860	0.000	0.000	0.000
476	0.000	0.000	0.000	49.400	89.805	0.000	0.000
477	0.000	0.000	0.000	129.101	132.093	0.000	0.000
478	0.000	0.000	0.000	578.891	0.000	0.000	0.000
479	0.000	0.000	0.000	45.013	61.819	0.000	0.000
480	0.000	20.602	0.000	394.897	0.000	0.000	0.000
481	0.000	0.000	0.000	38.220	327.693	0.000	0.000
482	0.000	0.000	0.000	283.601	75.878	0.000	0.000
483	0.000	0.000	0.000	49.251	190.763	0.000	0.000
484	0.000	164.800	0.000	741.101	58.336	0.000	0.000
485	71.000	0.000	0.000	17.644	104.249	0.000	0.000
486	535.000	0.000	0.000	0.000	0.000	0.000	0.000
487	0.000	0.000	293.000	379.000	0.000	0.000	0.000
488	0.000	0.000	0.000	1,283.612	14.116	0.000	0.000
489	0.000	0.000	0.000	21.776	46.594	100.426	0.000
490	0.000	15.120	153.000	476.442	0.000	0.000	0.000
491	0.000	0.000	0.000	288.995	14.778	84.046	0.000
492	0.000	0.000	0.000	15.900	150.490	0.000	0.000
493	0.000	15.492	0.000	224.666	0.000	0.000	0.000
494	0.000	0.000	340.000	110.165	0.000	0.000	0.000
495	0.000	24.417	0.000	118.780	288.464	0.000	0.000
496	0.000	0.000	0.000	224.169	107.371	0.000	0.000
497	290.000	14.908	0.000	28.815	2.336	0.000	174.000
498	0.000	106.273	0.000	770.844	0.000	0.000	0.000
499	0.000	16.312	0.000	147.148	196.156	0.000	0.000
500	0.000	0.000	0.000	448.222	0.000	0.000	0.000
501	0.000	0.000	502.000	0.000	0.000	0.000	0.000
502	0.000	0.000	0.000	68.640	0.000	0.000	0.000
503	0.000	0.188	0.000	417.023	8.766	34.757	0.000
504	0.000	0.393	0.000	857.166	0.000	0.000	0.000
505	0.000	0.000	526.000	0.000	1.124	0.000	0.000
506	0.000	18.369	0.000	74.073	0.000	0.000	0.000

2008 No Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	**235**	**236**	**237**	**238**	**239**	**240**	**241**
507	0.000	0.000	0.000	93.840	0.000	0.000	0.000
508	0.000	0.000	0.000	0.000	0.000	0.000	0.000
509	0.000	3.267	0.000	834.141	0.000	64.547	0.000
510	0.000	12.039	0.000	1,126.485	0.000	0.000	0.000
511	0.000	12.011	215.000	65.945	0.000	0.000	0.000
512	0.000	0.000	0.000	114.729	0.000	0.000	0.000
513	0.000	0.000	0.000	94.006	1.600	0.000	0.000
514	0.000	32.660	0.000	24.100	0.000	0.000	0.000
515	0.000	0.000	0.000	0.000	0.000	0.000	0.000
516	114.000	127.419	0.000	966.224	0.000	0.000	0.000
517	0.000	0.000	0.000	7.354	81.647	0.000	0.000
518	0.000	0.000	0.000	111.172	0.000	0.000	0.000
519	0.000	0.000	293.000	0.000	0.000	0.000	0.000
520	0.000	0.000	0.000	74.633	0.000	0.000	0.000
521	0.000	0.000	0.000	260.979	63.252	0.000	0.000
522	0.000	9.450	0.000	96.222	0.000	0.000	0.000
523	118.000	0.000	0.000	1,682.996	0.000	0.000	0.000
524	0.000	0.000	0.000	413.395	0.000	0.000	0.000
525	0.000	0.000	0.000	452.828	202.253	0.000	0.000
526	261.000	3.000	0.000	65.858	0.000	0.000	0.000
527	0.000	0.000	0.000	0.000	0.000	0.000	0.000
528	0.000	0.000	0.000	25.828	143.727	0.000	0.000
529	0.000	0.000	0.000	68.771	108.037	0.000	0.000
530	0.000	0.000	0.000	91.438	0.000	0.000	0.000
531	0.000	0.000	0.000	137.700	0.000	0.000	0.000
532	825.000	0.000	0.000	0.000	0.100	0.000	0.000
533	0.000	0.000	0.000	44.065	1.193	0.000	0.000
534	0.000	8.850	0.000	466.156	1.665	0.000	0.000
535	0.000	0.000	0.000	0.000	0.000	0.000	0.000
536	0.000	0.000	0.000	38.105	22.824	0.000	0.000
537	0.000	20.962	0.000	69.724	0.000	0.000	0.000
538	0.000	15.772	0.000	339.810	12.000	0.000	0.000
539	0.000	0.000	0.000	62.392	20.366	0.000	0.000
540	617.000	0.000	0.000	0.000	0.000	0.000	0.000
541	0.000	0.000	0.000	74.771	0.000	0.000	0.000
542	0.000	35.635	0.000	77.798	0.779	0.000	0.000
543	0.000	8.500	0.000	110.109	17.536	0.000	0.000
544	1,809.000	11.343	0.000	0.000	0.000	0.000	0.000
545	0.000	16.325	0.000	80.681	82.557	0.000	0.000
546	0.000	68.820	0.000	1,351.829	18.310	0.000	0.000
Total	**5,011**	**1,341**	**2,322**	**26,381**	**14,701**	**348**	**174**

2008 With Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	235	236	237	238	239	240	241
395	0.000	0.000	0.000	206.572	357.706	0.000	0.000
396	0.000	0.000	0.000	253.602	408.746	0.000	0.000
397	0.000	22.109	0.000	107.291	243.813	0.000	0.000
398	0.000	12.052	0.000	81.093	168.382	0.000	0.000
399	0.000	0.000	0.000	255.529	289.499	0.000	0.000
400	0.000	0.000	0.000	176.669	551.910	0.000	0.000
401	0.000	0.000	0.000	178.824	231.849	0.000	0.000
402	0.000	0.000	0.000	112.123	136.185	0.000	0.000
403	0.000	237.693	0.000	91.261	18.610	0.000	0.000
404	0.000	0.000	0.000	390.178	156.914	0.000	0.000
405	0.000	0.000	0.000	195.340	224.252	0.000	0.000
406	0.000	0.000	0.000	67.367	129.081	0.000	0.000
407	0.000	0.000	0.000	50.517	117.130	0.000	0.000
408	0.000	0.910	0.000	203.894	132.687	0.000	0.000
409	0.000	0.000	0.000	261.087	156.347	0.000	0.000
410	142.000	0.000	0.000	58.917	97.785	0.000	0.000
411	192.000	5.000	0.000	336.213	362.318	0.000	0.000
412	0.000	0.000	0.000	74.634	120.728	0.000	0.000
413	0.000	0.000	0.000	230.368	251.333	0.000	0.000
414	0.000	4.330	0.000	278.900	319.852	0.000	132.000
415	0.000	0.000	0.000	72.505	70.180	0.000	0.000
416	0.000	4.000	0.000	113.071	209.514	0.000	0.000
417	142.000	0.000	0.000	103.609	0.000	0.000	0.000
418	0.000	0.000	0.000	155.307	158.835	0.000	0.000
419	0.000	0.000	0.000	6.731	69.440	0.000	0.000
420	169.000	0.000	0.000	130.522	240.009	0.000	0.000
421	337.000	0.000	0.000	119.995	30.372	0.000	0.000
422	1.000	0.000	0.000	267.563	253.044	64.280	0.000
423	0.000	0.000	0.000	260.783	0.000	0.000	0.000
424	0.000	0.000	0.000	96.625	158.715	0.000	0.000
425	364.000	0.000	0.000	196.808	0.232	0.000	0.000
426	0.000	1.760	0.000	320.276	79.691	0.000	0.000
427	0.000	0.000	0.000	77.041	59.674	0.000	0.000
428	0.000	1.902	0.000	103.026	175.770	0.000	0.000
429	270.000	0.000	0.000	129.790	164.608	0.000	0.000
430	0.000	0.000	0.000	455.361	166.265	0.000	0.000
431	297.000	1.930	0.000	90.256	192.833	0.000	0.000
432	0.000	0.000	0.000	90.064	43.919	0.000	0.000
433	135.000	0.000	0.000	28.586	78.877	0.000	0.000
434	0.000	0.000	0.000	140.297	146.061	0.000	0.000
435	0.000	0.000	0.000	41.643	67.700	0.000	0.000
436	0.000	0.000	0.000	192.847	75.073	0.000	0.000
437	0.000	0.600	0.000	168.516	45.696	0.000	0.000
438	203.000	0.000	0.000	138.033	208.405	0.000	0.000
439	0.000	0.000	0.000	300.646	384.005	0.000	0.000
440	243.000	0.000	0.000	11.211	59.119	0.000	0.000
441	0.000	30.965	0.000	134.284	187.637	0.000	0.000
442	203.000	0.000	0.000	21.787	42.750	0.000	0.000
443	0.000	20.562	0.000	66.785	6.094	0.000	0.000
444	0.000	0.000	0.000	42.205	26.561	0.000	0.000
445	235.000	0.000	0.000	41.065	28.829	0.000	0.000
446	615.000	10.000	0.000	55.600	131.435	0.000	0.000
447	0.000	3.724	0.000	41.371	115.050	0.000	0.000
448	0.000	13.900	0.000	106.519	30.581	0.000	0.000
449	0.000	0.000	0.000	97.994	188.995	0.000	0.000
450	0.000	0.000	0.000	24.887	126.562	0.000	0.000

2008 With Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	235	236	237	238	239	240	241
451	0.000	0.000	0.000	92.560	2.748	0.000	0.000
452	0.000	4.558	0.000	264.845	11.091	0.000	0.000
453	0.000	0.000	0.000	267.937	2.024	0.000	0.000
454	0.000	0.000	0.000	129.400	0.000	0.000	0.000
455	234.000	0.000	0.000	52.785	57.225	0.000	0.000
456	0.000	86.441	0.000	332.056	592.892	0.000	0.000
457	0.000	0.000	0.000	122.418	136.941	0.000	0.000
458	0.000	0.000	0.000	148.891	50.841	0.000	0.000
459	0.000	4.880	0.000	424.093	42.088	0.000	0.000
460	0.000	0.000	0.000	167.967	127.119	0.000	0.000
461	0.000	0.000	0.000	85.177	178.411	0.000	0.000
462	0.000	0.000	0.000	326.779	325.913	0.000	0.000
463	0.000	0.000	0.000	46.208	59.216	0.000	0.000
464	349.000	0.000	0.000	88.820	1.894	0.000	0.000
465	0.000	0.000	0.000	57.000	82.562	0.000	122.000
466	0.000	7.968	0.000	36.475	12.800	0.000	0.000
467	0.000	0.000	0.000	212.570	0.000	0.000	0.000
468	0.000	10.000	0.000	69.652	151.148	0.000	0.000
469	0.000	0.000	0.000	149.645	10.715	0.000	0.000
470	0.000	62.988	0.000	140.752	78.386	0.000	0.000
471	0.000	2.669	0.000	342.601	234.080	0.000	0.000
472	0.000	0.000	0.000	30.842	50.073	0.000	0.000
473	0.000	0.000	0.000	122.013	127.982	0.000	0.000
474	594.000	0.000	0.000	114.317	139.513	0.000	0.000
475	0.000	27.134	0.000	12.322	0.000	0.000	0.000
476	0.000	10.000	0.000	35.005	66.398	0.000	0.000
477	0.000	0.000	0.000	146.137	127.220	0.000	0.000
478	0.000	15.000	0.000	509.702	0.116	0.000	0.000
479	0.000	0.000	0.000	45.431	61.730	0.000	0.000
480	0.000	20.602	0.000	394.897	0.000	0.000	0.000
481	0.000	15.000	0.000	67.394	301.474	0.000	0.000
482	0.000	0.000	0.000	295.101	74.212	0.000	0.000
483	0.000	0.000	0.000	50.192	190.462	0.000	0.000
484	0.000	174.126	0.000	746.810	58.336	0.000	0.000
485	521.000	0.000	0.000	21.245	54.745	0.000	0.000
486	541.000	0.000	0.000	0.000	0.000	0.000	0.000
487	0.000	4.922	293.000	381.554	0.000	0.000	0.000
488	0.000	6.994	0.000	1,287.241	14.116	0.000	0.000
489	270.000	0.000	0.000	18.832	19.961	0.000	0.000
490	481.000	15.120	153.000	565.655	0.000	0.000	0.000
491	0.000	0.000	0.000	541.683	98.824	0.000	170.000
492	396.000	0.000	0.000	9.297	85.292	0.000	0.000
493	0.000	15.492	0.000	238.955	0.000	0.000	0.000
494	0.000	2.419	340.000	177.584	0.000	0.000	0.000
495	203.000	30.000	0.000	113.360	192.498	0.000	0.000
496	0.000	0.000	0.000	235.042	105.106	0.000	0.000
497	290.000	14.908	0.000	67.160	2.336	0.000	174.000
498	0.000	108.040	0.000	926.117	0.000	0.000	0.000
499	155.000	26.312	0.000	125.279	140.205	0.000	0.000
500	0.000	0.000	0.000	448.222	0.000	0.000	0.000
501	0.000	0.000	502.000	0.000	0.000	0.000	0.000
502	0.000	0.000	0.000	68.640	0.000	0.000	0.000
503	0.000	0.188	0.000	568.939	8.766	34.757	0.000
504	0.000	0.393	0.000	862.866	0.000	0.000	0.000
505	0.000	0.000	526.000	0.000	1.124	0.000	0.000
506	0.000	18.369	0.000	74.073	0.000	0.000	0.000

2008 With Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	**235**	**236**	**237**	**238**	**239**	**240**	**241**
507	0.000	0.000	0.000	93.840	0.000	0.000	0.000
508	827.000	0.000	0.000	0.000	0.000	0.000	0.000
509	0.000	3.267	0.000	838.199	0.000	64.547	0.000
510	0.000	12.039	0.000	1,129.961	0.000	0.000	0.000
511	0.000	12.011	215.000	85.899	0.000	0.000	0.000
512	0.000	0.000	0.000	126.048	0.000	0.000	0.000
513	0.000	0.000	0.000	94.006	1.600	0.000	0.000
514	0.000	32.660	0.000	79.100	0.000	0.000	0.000
515	553.000	19.700	0.000	90.000	0.000	0.000	0.000
516	232.000	177.419	154.000	1,432.885	0.000	0.000	0.000
517	0.000	0.000	0.000	37.354	81.647	0.000	0.000
518	0.000	0.000	0.000	376.339	0.000	0.000	0.000
519	0.000	0.000	293.000	0.000	0.000	0.000	0.000
520	0.000	0.000	0.000	74.633	0.000	0.000	0.000
521	0.000	0.000	0.000	289.746	63.252	0.000	0.000
522	0.000	30.450	0.000	797.349	15.000	0.000	0.000
523	1,776.000	172.581	154.000	2,264.885	0.000	0.000	0.000
524	0.000	0.000	0.000	413.395	0.000	0.000	0.000
525	0.000	0.000	0.000	467.128	202.253	0.000	0.000
526	459.000	3.000	0.000	65.858	0.000	0.000	0.000
527	156.000	0.000	0.000	0.000	0.000	0.000	0.000
528	0.000	7.750	0.000	495.000	0.000	0.000	0.000
529	0.000	0.000	0.000	99.759	108.037	0.000	0.000
530	319.000	0.000	0.000	1.000	0.000	0.000	0.000
531	0.000	0.000	0.000	137.700	0.000	0.000	0.000
532	825.000	0.000	0.000	2.174	0.100	0.000	0.000
533	0.000	0.000	0.000	45.289	1.193	0.000	0.000
534	211.000	8.850	0.000	406.794	1.665	0.000	0.000
535	0.000	33.750	250.000	487.130	0.000	0.000	0.000
536	0.000	0.000	0.000	44.098	22.824	0.000	0.000
537	386.000	0.000	0.000	1.000	0.000	0.000	0.000
538	0.000	15.772	0.000	339.810	12.000	0.000	0.000
539	0.000	0.000	0.000	86.238	20.366	0.000	0.000
540	617.000	0.000	0.000	0.000	0.000	0.000	0.000
541	286.000	0.000	0.000	0.579	0.061	0.000	0.000
542	0.000	35.635	0.000	98.570	0.779	0.000	0.000
543	596.000	7.900	0.000	0.000	0.000	0.000	0.000
544	1,809.000	11.343	0.000	266.088	0.000	0.000	0.000
545	404.000	22.100	0.000	70.375	54.177	0.000	0.000
546	0.000	68.820	0.000	1,462.817	18.310	0.000	0.000
Total	**17,038**	**1,731**	**2,880**	**33,716**	**13,180**	**164**	**598**

2015 Cumulative Baseline No Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	235	236	237	238	239	240	241
395	0.000	0.000	0.000	41.978	357.706	0.000	0.000
396	0.000	0.000	0.000	184.047	408.746	0.000	0.000
397	0.000	22.109	0.000	45.714	243.813	0.000	0.000
398	0.000	12.052	0.000	61.261	168.382	0.000	0.000
399	0.000	0.000	0.000	105.472	289.499	0.000	0.000
400	0.000	0.000	0.000	102.302	551.910	0.000	0.000
401	0.000	0.000	0.000	107.598	231.849	0.000	0.000
402	0.000	0.000	0.000	79.916	136.185	0.000	0.000
403	0.000	237.693	0.000	0.000	18.610	0.000	0.000
404	0.000	0.000	0.000	128.862	155.119	0.000	0.000
405	0.000	0.000	0.000	133.676	224.252	0.000	0.000
406	0.000	0.000	0.000	9.886	129.081	0.000	0.000
407	0.000	0.000	0.000	22.256	117.130	0.000	0.000
408	0.000	0.910	0.000	169.381	132.687	0.000	0.000
409	0.000	0.000	0.000	222.870	156.347	0.000	0.000
410	0.000	0.000	0.000	24.143	143.356	0.000	0.000
411	192.000	5.000	0.000	70.655	345.651	0.000	0.000
412	0.000	0.000	0.000	48.906	120.728	0.000	0.000
413	0.000	0.000	0.000	100.768	251.333	0.000	0.000
414	0.000	4.330	0.000	231.479	319.852	0.000	0.000
415	0.000	0.000	0.000	54.534	70.180	0.000	0.000
416	0.000	4.000	0.000	68.684	159.864	0.000	0.000
417	0.000	0.000	0.000	139.669	13.986	0.000	0.000
418	0.000	0.000	0.000	130.998	158.835	0.000	0.000
419	0.000	0.000	0.000	0.708	69.440	0.000	0.000
420	0.000	0.000	0.000	117.585	280.974	0.000	0.000
421	0.000	0.000	0.000	130.183	118.674	0.000	0.000
422	1.000	0.000	0.000	25.673	196.378	64.280	0.000
423	0.000	0.000	0.000	160.783	0.000	0.000	0.000
424	0.000	0.000	0.000	76.103	158.715	0.000	0.000
425	0.000	0.000	0.000	300.700	0.000	0.000	0.000
426	0.000	1.760	0.000	301.550	79.691	0.000	0.000
427	0.000	0.000	0.000	55.503	59.674	0.000	0.000
428	0.000	1.902	0.000	62.777	175.770	0.000	0.000
429	0.000	0.000	0.000	139.005	199.456	0.000	0.000
430	0.000	0.000	0.000	437.938	166.265	0.000	0.000
431	0.000	1.930	0.000	84.263	278.240	0.000	0.000
432	0.000	0.000	0.000	71.072	43.919	0.000	0.000
433	0.000	0.000	0.000	30.004	157.309	0.000	0.000
434	0.000	0.000	0.000	103.377	146.061	0.000	0.000
435	0.000	0.000	0.000	19.717	67.700	0.000	0.000
436	0.000	0.000	0.000	170.122	75.073	0.000	0.000
437	0.000	0.600	0.000	120.180	45.696	0.000	0.000
438	0.000	0.000	0.000	138.019	262.960	0.000	0.000
439	0.000	0.000	0.000	228.554	384.005	0.000	0.000
440	0.000	0.000	0.000	10.270	192.220	0.000	0.000
441	0.000	30.965	0.000	117.389	187.637	0.000	0.000
442	0.000	0.000	0.000	19.602	92.070	0.000	0.000
443	0.000	20.562	0.000	63.768	6.094	0.000	0.000
444	0.000	0.000	0.000	35.263	26.561	0.000	0.000
445	0.000	0.000	0.000	46.750	128.372	0.000	0.000
446	0.000	0.000	0.000	80.516	249.836	0.000	0.000
447	0.000	3.724	0.000	27.623	117.983	0.000	0.000
448	0.000	13.900	0.000	106.519	30.581	0.000	0.000
449	0.000	0.000	0.000	60.097	196.890	0.000	0.000

2015 Cumulative Baseline No Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	235	236	237	238	239	240	241
450	0.000	0.000	0.000	16.690	126.562	0.000	0.000
451	0.000	0.000	0.000	92.560	2.748	0.000	0.000
452	0.000	4.558	0.000	264.845	11.091	0.000	0.000
453	0.000	0.000	0.000	267.267	2.024	0.000	0.000
454	0.000	0.000	0.000	129.400	0.000	0.000	0.000
455	0.000	0.000	0.000	62.455	112.164	0.000	0.000
456	0.000	86.441	0.000	119.414	597.674	0.000	0.000
457	0.000	0.000	0.000	78.119	136.941	0.000	0.000
458	0.000	0.000	0.000	84.398	50.841	0.000	0.000
459	0.000	4.880	0.000	414.001	42.088	0.000	0.000
460	0.000	0.000	0.000	43.782	127.119	0.000	0.000
461	0.000	0.000	0.000	32.083	184.693	0.000	0.000
462	0.000	0.000	0.000	81.131	340.969	0.000	0.000
463	0.000	0.000	0.000	36.731	40.681	0.000	0.000
464	178.000	0.000	0.000	101.520	67.994	0.000	0.000
465	0.000	0.000	0.000	35.778	105.962	0.000	0.000
466	0.000	7.968	0.000	36.475	12.800	0.000	0.000
467	0.000	0.000	0.000	212.570	0.000	0.000	0.000
468	0.000	0.000	0.000	45.507	203.336	0.000	0.000
469	0.000	0.000	0.000	143.425	12.000	0.000	0.000
470	0.000	62.988	0.000	133.122	78.386	0.000	0.000
471	0.000	2.669	0.000	278.460	158.741	0.000	0.000
472	0.000	0.000	0.000	18.192	52.712	0.000	0.000
473	0.000	0.000	0.000	82.075	132.188	0.000	0.000
474	0.000	0.000	0.000	133.909	353.186	0.000	0.000
475	0.000	27.134	0.000	3.860	0.000	0.000	0.000
476	0.000	0.000	0.000	49.400	89.805	0.000	0.000
477	0.000	0.000	0.000	129.101	132.093	0.000	0.000
478	0.000	0.000	0.000	578.891	0.000	0.000	0.000
479	0.000	0.000	0.000	45.013	61.819	0.000	0.000
480	0.000	20.602	0.000	394.897	0.000	0.000	0.000
481	0.000	0.000	0.000	38.220	327.693	0.000	0.000
482	0.000	0.000	0.000	283.601	75.878	0.000	0.000
483	0.000	0.000	0.000	49.251	190.763	0.000	0.000
484	0.000	164.800	0.000	741.101	58.336	0.000	0.000
485	71.000	0.000	0.000	17.644	104.249	0.000	0.000
486	535.000	0.000	0.000	0.000	0.000	0.000	0.000
487	0.000	0.000	293.000	379.000	0.000	0.000	0.000
488	0.000	0.000	0.000	1,283.612	14.116	0.000	0.000
489	0.000	0.000	0.000	21.776	46.594	100.426	0.000
490	0.000	15.120	153.000	476.442	0.000	0.000	0.000
491	0.000	0.000	0.000	288.995	14.778	84.046	0.000
492	0.000	0.000	0.000	15.900	150.490	0.000	0.000
493	0.000	15.492	0.000	224.666	0.000	0.000	0.000
494	0.000	0.000	340.000	110.165	0.000	0.000	0.000
495	0.000	24.417	0.000	118.780	288.464	0.000	0.000
496	0.000	0.000	0.000	224.169	107.371	0.000	0.000
497	290.000	14.908	0.000	28.815	2.336	0.000	174.000
498	0.000	106.273	0.000	770.844	0.000	0.000	0.000
499	0.000	16.312	0.000	147.148	196.156	0.000	0.000
500	0.000	0.000	0.000	448.222	0.000	0.000	0.000
501	0.000	0.000	502.000	0.000	0.000	0.000	0.000
502	0.000	0.000	0.000	68.640	0.000	0.000	0.000
503	0.000	0.188	0.000	417.023	8.766	34.757	0.000
504	0.000	0.393	0.000	857.166	0.000	0.000	0.000

2015 Cumulative Baseline No Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	**235**	**236**	**237**	**238**	**239**	**240**	**241**
505	0.000	0.000	526.000	0.000	1.124	0.000	0.000
506	0.000	18.369	0.000	74.073	0.000	0.000	0.000
507	0.000	0.000	0.000	93.840	0.000	0.000	0.000
508	0.000	0.000	0.000	0.000	0.000	0.000	0.000
509	0.000	3.267	0.000	834.141	0.000	64.547	0.000
510	0.000	12.039	0.000	1,126.485	0.000	0.000	0.000
511	0.000	12.011	215.000	65.945	0.000	0.000	0.000
512	0.000	0.000	0.000	114.729	0.000	0.000	0.000
513	0.000	0.000	0.000	94.006	1.600	0.000	0.000
514	0.000	32.660	0.000	24.100	0.000	0.000	0.000
515	0.000	0.000	0.000	0.000	0.000	0.000	0.000
516	114.000	127.419	0.000	966.224	0.000	0.000	0.000
517	0.000	0.000	0.000	7.354	81.647	0.000	0.000
518	0.000	0.000	0.000	111.172	0.000	0.000	0.000
519	0.000	0.000	293.000	0.000	0.000	0.000	0.000
520	0.000	0.000	0.000	74.633	0.000	0.000	0.000
521	0.000	0.000	0.000	260.979	63.252	0.000	0.000
522	0.000	9.450	0.000	96.222	0.000	0.000	0.000
523	118.000	0.000	0.000	1,682.996	0.000	0.000	0.000
524	0.000	0.000	0.000	413.395	0.000	0.000	0.000
525	0.000	0.000	0.000	452.828	202.253	0.000	0.000
526	261.000	3.000	0.000	65.858	0.000	0.000	0.000
527	0.000	0.000	0.000	0.000	0.000	0.000	0.000
528	0.000	0.000	0.000	25.828	143.727	0.000	0.000
529	0.000	0.000	0.000	68.771	108.037	0.000	0.000
530	0.000	0.000	0.000	91.438	0.000	0.000	0.000
531	0.000	0.000	0.000	137.700	0.000	0.000	0.000
532	825.000	0.000	0.000	0.000	0.100	0.000	0.000
533	0.000	0.000	0.000	44.065	1.193	0.000	0.000
534	0.000	8.850	0.000	466.156	1.665	0.000	0.000
535	0.000	0.000	0.000	0.000	0.000	0.000	0.000
536	0.000	0.000	0.000	38.105	22.824	0.000	0.000
537	0.000	20.962	0.000	69.724	0.000	0.000	0.000
538	0.000	15.772	0.000	339.810	12.000	0.000	0.000
539	0.000	0.000	0.000	62.392	20.366	0.000	0.000
540	617.000	0.000	0.000	0.000	0.000	0.000	0.000
541	0.000	0.000	0.000	74.771	0.000	0.000	0.000
542	0.000	35.635	0.000	77.798	0.779	0.000	0.000
543	0.000	8.500	0.000	110.109	17.536	0.000	0.000
544	1,809.000	11.343	0.000	0.000	0.000	0.000	0.000
545	0.000	16.325	0.000	80.681	82.557	0.000	0.000
546	0.000	68.820	0.000	1,351.829	18.310	0.000	0.000
Total	**5,011**	**1,341**	**2,322**	**26,381**	**14,701**	**348**	**174**

2015 Cumulative With Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	235	236	237	238	239	240	241
395	0.000	0.000	0.000	41.978	357.706	0.000	0.000
396	0.000	0.000	0.000	184.047	408.746	0.000	0.000
397	0.000	22.109	0.000	45.714	243.813	0.000	0.000
398	0.000	12.052	0.000	61.261	168.382	0.000	0.000
399	0.000	0.000	0.000	105.472	289.499	0.000	0.000
400	0.000	0.000	0.000	102.302	551.910	0.000	0.000
401	0.000	0.000	0.000	107.598	231.849	0.000	0.000
402	0.000	0.000	0.000	79.916	136.185	0.000	0.000
403	0.000	237.693	0.000	0.000	18.610	0.000	0.000
404	0.000	0.000	0.000	128.862	155.119	0.000	0.000
405	0.000	0.000	0.000	133.676	224.252	0.000	0.000
406	0.000	0.000	0.000	9.886	129.081	0.000	0.000
407	0.000	0.000	0.000	22.256	117.130	0.000	0.000
408	0.000	0.910	0.000	169.381	132.687	0.000	0.000
409	0.000	0.000	0.000	222.870	156.347	0.000	0.000
410	0.000	0.000	0.000	24.143	143.356	0.000	0.000
411	192.000	5.000	0.000	70.655	345.651	0.000	0.000
412	0.000	0.000	0.000	48.906	120.728	0.000	0.000
413	0.000	0.000	0.000	100.768	251.333	0.000	0.000
414	0.000	4.330	0.000	231.479	319.852	0.000	132.000
415	0.000	0.000	0.000	54.534	70.180	0.000	0.000
416	0.000	4.000	0.000	68.684	159.864	0.000	0.000
417	0.000	0.000	0.000	139.669	13.986	0.000	0.000
418	0.000	0.000	0.000	130.998	158.835	0.000	0.000
419	0.000	0.000	0.000	0.708	69.440	0.000	0.000
420	0.000	0.000	0.000	117.585	280.974	0.000	0.000
421	0.000	0.000	0.000	130.183	118.674	0.000	0.000
422	1.000	0.000	0.000	25.673	196.378	64.280	0.000
423	0.000	0.000	0.000	160.783	0.000	0.000	0.000
424	0.000	0.000	0.000	76.103	158.715	0.000	0.000
425	0.000	0.000	0.000	300.700	0.000	0.000	0.000
426	0.000	1.760	0.000	301.550	79.691	0.000	0.000
427	0.000	0.000	0.000	55.503	59.674	0.000	0.000
428	0.000	1.902	0.000	62.777	175.770	0.000	0.000
429	0.000	0.000	0.000	139.005	199.456	0.000	0.000
430	0.000	0.000	0.000	437.938	166.265	0.000	0.000
431	0.000	1.930	0.000	84.263	278.240	0.000	0.000
432	0.000	0.000	0.000	71.072	43.919	0.000	0.000
433	0.000	0.000	0.000	30.004	157.309	0.000	0.000
434	0.000	0.000	0.000	103.377	146.061	0.000	0.000
435	0.000	0.000	0.000	19.717	67.700	0.000	0.000
436	0.000	0.000	0.000	170.122	75.073	0.000	0.000
437	0.000	0.600	0.000	154.535	45.696	0.000	0.000
438	0.000	0.000	0.000	138.019	262.960	0.000	0.000
439	0.000	0.000	0.000	228.554	384.005	0.000	0.000
440	0.000	0.000	0.000	38.486	192.220	0.000	0.000
441	0.000	30.965	0.000	117.389	187.637	0.000	0.000
442	0.000	0.000	0.000	19.602	92.070	0.000	0.000
443	0.000	20.562	0.000	63.768	6.094	0.000	0.000
444	0.000	0.000	0.000	35.263	26.561	0.000	0.000
445	235.000	0.000	0.000	16.746	77.666	0.000	0.000
446	615.000	0.000	0.000	56.268	184.621	0.000	0.000
447	0.000	3.724	0.000	27.623	117.983	0.000	0.000
448	0.000	13.900	0.000	106.519	30.581	0.000	0.000
449	0.000	0.000	0.000	60.097	196.890	0.000	0.000
450	0.000	0.000	0.000	16.690	126.562	0.000	0.000

2015 Cumulative With Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	235	236	237	238	239	240	241
451	0.000	0.000	0.000	92.560	2.748	0.000	0.000
452	0.000	4.558	0.000	264.845	11.091	0.000	0.000
453	0.000	0.000	0.000	267.267	2.024	0.000	0.000
454	0.000	0.000	0.000	129.400	0.000	0.000	0.000
455	234.000	0.000	0.000	32.451	61.457	0.000	0.000
456	0.000	86.441	0.000	220.896	597.674	0.000	0.000
457	0.000	0.000	0.000	78.119	136.941	0.000	0.000
458	0.000	0.000	0.000	84.398	50.841	0.000	0.000
459	0.000	4.880	0.000	414.001	42.088	0.000	0.000
460	0.000	0.000	0.000	43.782	127.119	0.000	0.000
461	0.000	0.000	0.000	32.083	184.693	0.000	0.000
462	0.000	0.000	0.000	322.185	340.969	0.000	0.000
463	0.000	0.000	0.000	36.731	40.681	0.000	0.000
464	349.000	0.000	0.000	88.820	1.894	0.000	0.000
465	0.000	0.000	0.000	29.778	82.562	0.000	122.000
466	0.000	7.968	0.000	36.475	12.800	0.000	0.000
467	0.000	0.000	0.000	212.570	0.000	0.000	0.000
468	0.000	0.000	0.000	74.177	176.265	0.000	0.000
469	0.000	0.000	0.000	143.425	12.000	0.000	0.000
470	0.000	62.988	0.000	133.122	78.386	0.000	0.000
471	0.000	2.669	0.000	275.705	134.006	0.000	0.000
472	0.000	0.000	0.000	18.192	52.712	0.000	0.000
473	0.000	0.000	0.000	45.441	132.188	0.000	0.000
474	0.000	0.000	0.000	133.909	353.186	0.000	0.000
475	0.000	27.134	0.000	3.860	0.000	0.000	0.000
476	0.000	0.000	0.000	49.400	89.805	0.000	0.000
477	0.000	0.000	0.000	129.101	132.093	0.000	0.000
478	0.000	0.000	0.000	580.944	0.000	0.000	0.000
479	0.000	0.000	0.000	45.013	61.819	0.000	0.000
480	0.000	20.602	0.000	394.897	0.000	0.000	0.000
481	0.000	0.000	0.000	38.220	327.693	0.000	0.000
482	0.000	0.000	0.000	283.601	75.878	0.000	0.000
483	0.000	0.000	0.000	49.251	190.763	0.000	0.000
484	0.000	164.800	0.000	741.101	58.336	0.000	0.000
485	319.000	0.000	0.000	17.644	104.249	0.000	0.000
486	541.000	0.000	0.000	0.000	0.000	0.000	0.000
487	0.000	0.000	293.000	379.000	0.000	0.000	0.000
488	0.000	0.000	0.000	1,283.612	14.116	0.000	0.000
489	0.000	0.000	0.000	21.776	46.594	100.426	0.000
490	481.000	15.120	153.000	476.442	0.000	0.000	0.000
491	0.000	0.000	0.000	288.995	14.778	84.046	170.000
492	194.000	0.000	0.000	0.000	137.092	0.000	0.000
493	0.000	15.492	0.000	224.666	0.000	0.000	0.000
494	0.000	0.000	340.000	110.165	0.000	0.000	0.000
495	0.000	24.417	0.000	118.780	288.464	0.000	0.000
496	0.000	0.000	0.000	224.169	107.371	0.000	0.000
497	290.000	14.908	0.000	28.815	2.336	0.000	174.000
498	0.000	106.273	0.000	770.844	0.000	0.000	0.000
499	0.000	16.312	0.000	147.148	196.156	0.000	0.000
500	0.000	0.000	0.000	448.222	0.000	0.000	0.000
501	0.000	0.000	502.000	0.000	0.000	0.000	0.000
502	0.000	0.000	0.000	68.640	0.000	0.000	0.000
503	0.000	0.188	0.000	417.023	8.766	34.757	0.000
504	0.000	0.393	0.000	857.166	0.000	0.000	0.000
505	0.000	0.000	526.000	0.000	1.124	0.000	0.000
506	0.000	18.369	0.000	74.073	0.000	0.000	0.000

2015 Cumulative With Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	**235**	**236**	**237**	**238**	**239**	**240**	**241**
507	0.000	0.000	0.000	93.840	0.000	0.000	0.000
508	827.000	0.000	0.000	0.000	0.000	0.000	0.000
509	0.000	3.267	0.000	834.141	0.000	64.547	0.000
510	0.000	12.039	0.000	1,126.485	0.000	0.000	0.000
511	0.000	12.011	215.000	65.945	0.000	0.000	0.000
512	0.000	0.000	0.000	114.729	0.000	0.000	0.000
513	0.000	0.000	0.000	94.006	1.600	0.000	0.000
514	0.000	32.660	0.000	24.100	0.000	0.000	0.000
515	553.000	19.700	0.000	90.000	0.000	0.000	0.000
516	232.000	177.419	0.000	966.224	0.000	0.000	0.000
517	0.000	0.000	0.000	7.354	81.647	0.000	0.000
518	0.000	0.000	0.000	361.172	0.000	0.000	0.000
519	0.000	0.000	293.000	0.000	0.000	0.000	0.000
520	0.000	0.000	0.000	74.633	0.000	0.000	0.000
521	0.000	0.000	0.000	260.979	63.252	0.000	0.000
522	0.000	9.450	0.000	47.118	0.000	0.000	0.000
523	1,000.000	25.000	0.000	1,683.241	0.000	0.000	0.000
524	0.000	0.000	0.000	413.395	0.000	0.000	0.000
525	0.000	0.000	0.000	467.128	202.253	0.000	0.000
526	459.000	3.000	0.000	65.858	0.000	0.000	0.000
527	156.000	0.000	0.000	0.000	0.000	0.000	0.000
528	0.000	7.750	0.000	495.000	0.000	0.000	0.000
529	0.000	0.000	0.000	99.759	108.037	0.000	0.000
530	0.000	0.000	0.000	91.438	0.000	0.000	0.000
531	0.000	0.000	0.000	137.700	0.000	0.000	0.000
532	825.000	0.000	0.000	0.000	0.100	0.000	0.000
533	0.000	0.000	0.000	44.065	1.193	0.000	0.000
534	0.000	8.850	0.000	466.156	1.665	0.000	0.000
535	0.000	33.750	250.000	487.130	0.000	0.000	0.000
536	0.000	0.000	0.000	38.105	22.824	0.000	0.000
537	0.000	20.962	0.000	69.724	0.000	0.000	0.000
538	0.000	15.772	0.000	339.810	12.000	0.000	0.000
539	0.000	0.000	0.000	62.392	20.366	0.000	0.000
540	617.000	0.000	0.000	0.000	0.000	0.000	0.000
541	0.000	0.000	0.000	74.771	0.000	0.000	0.000
542	0.000	35.635	0.000	77.798	0.779	0.000	0.000
543	596.000	7.900	0.000	0.000	0.000	0.000	0.000
544	1,809.000	11.343	0.000	0.000	0.000	0.000	0.000
545	404.000	22.100	0.000	49.780	60.360	0.000	0.000
546	0.000	68.820	0.000	1,351.829	18.310	0.000	0.000
Total	**10,929**	**1,482**	**2,572**	**27,810**	**14,196**	**348**	**598**

P2030 Cumulative Baseline No Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	235	236	237	238	239	240	241
395	0.000	0.000	0.000	41.978	357.706	0.000	0.000
396	0.000	0.000	0.000	184.047	408.746	0.000	0.000
397	0.000	22.109	0.000	45.714	243.813	0.000	0.000
398	0.000	12.052	0.000	61.261	168.382	0.000	0.000
399	0.000	0.000	0.000	105.472	289.499	0.000	0.000
400	0.000	0.000	0.000	102.302	551.910	0.000	0.000
401	0.000	0.000	0.000	107.598	231.849	0.000	0.000
402	0.000	0.000	0.000	79.916	136.185	0.000	0.000
403	0.000	237.693	0.000	0.000	18.610	0.000	0.000
404	0.000	0.000	0.000	128.862	155.119	0.000	0.000
405	0.000	0.000	0.000	133.676	224.252	0.000	0.000
406	0.000	0.000	0.000	9.886	129.081	0.000	0.000
407	0.000	0.000	0.000	22.256	117.130	0.000	0.000
408	0.000	0.910	0.000	169.381	132.687	0.000	0.000
409	0.000	0.000	0.000	222.870	156.347	0.000	0.000
410	0.000	0.000	0.000	24.143	143.356	0.000	0.000
411	192.000	5.000	0.000	70.655	345.651	0.000	0.000
412	0.000	0.000	0.000	48.906	120.728	0.000	0.000
413	0.000	0.000	0.000	100.768	251.333	0.000	0.000
414	0.000	4.330	0.000	231.479	319.852	0.000	0.000
415	0.000	0.000	0.000	54.534	70.180	0.000	0.000
416	0.000	4.000	0.000	68.684	159.864	0.000	0.000
417	0.000	0.000	0.000	139.669	13.986	0.000	0.000
418	0.000	0.000	0.000	130.998	158.835	0.000	0.000
419	0.000	0.000	0.000	0.708	69.440	0.000	0.000
420	0.000	0.000	0.000	117.585	280.974	0.000	0.000
421	0.000	0.000	0.000	130.183	118.674	0.000	0.000
422	1.000	0.000	0.000	25.673	196.378	64.280	0.000
423	0.000	0.000	0.000	160.783	0.000	0.000	0.000
424	0.000	0.000	0.000	76.103	158.715	0.000	0.000
425	0.000	0.000	0.000	300.700	0.000	0.000	0.000
426	0.000	1.760	0.000	301.550	79.691	0.000	0.000
427	0.000	0.000	0.000	55.503	59.674	0.000	0.000
428	0.000	1.902	0.000	62.777	175.770	0.000	0.000
429	0.000	0.000	0.000	139.005	199.456	0.000	0.000
430	0.000	0.000	0.000	437.938	166.265	0.000	0.000
431	0.000	1.930	0.000	84.263	278.240	0.000	0.000
432	0.000	0.000	0.000	71.072	43.919	0.000	0.000
433	0.000	0.000	0.000	30.004	157.309	0.000	0.000
434	0.000	0.000	0.000	103.377	146.061	0.000	0.000
435	0.000	0.000	0.000	19.717	67.700	0.000	0.000
436	0.000	0.000	0.000	170.122	75.073	0.000	0.000
437	0.000	0.600	0.000	120.180	45.696	0.000	0.000
438	0.000	0.000	0.000	138.019	262.960	0.000	0.000
439	0.000	0.000	0.000	228.554	384.005	0.000	0.000
440	0.000	0.000	0.000	10.270	192.220	0.000	0.000
441	0.000	30.965	0.000	117.389	187.637	0.000	0.000
442	0.000	0.000	0.000	19.602	92.070	0.000	0.000
443	0.000	20.562	0.000	63.768	6.094	0.000	0.000
444	0.000	0.000	0.000	35.263	26.561	0.000	0.000
445	0.000	0.000	0.000	46.750	128.372	0.000	0.000
446	0.000	0.000	0.000	80.516	249.836	0.000	0.000
447	0.000	3.724	0.000	27.623	117.983	0.000	0.000
448	0.000	13.900	0.000	106.519	30.581	0.000	0.000
449	0.000	0.000	0.000	60.097	196.890	0.000	0.000
450	0.000	0.000	0.000	16.690	126.562	0.000	0.000

P2030 Cumulative Baseline No Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	235	236	237	238	239	240	241
451	0.000	0.000	0.000	92.560	2.748	0.000	0.000
452	0.000	4.558	0.000	264.845	11.091	0.000	0.000
453	0.000	0.000	0.000	267.267	2.024	0.000	0.000
454	0.000	0.000	0.000	129.400	0.000	0.000	0.000
455	0.000	0.000	0.000	62.455	112.164	0.000	0.000
456	0.000	86.441	0.000	119.414	597.674	0.000	0.000
457	0.000	0.000	0.000	78.119	136.941	0.000	0.000
458	0.000	0.000	0.000	84.398	50.841	0.000	0.000
459	0.000	4.880	0.000	414.001	42.088	0.000	0.000
460	0.000	0.000	0.000	43.782	127.119	0.000	0.000
461	0.000	0.000	0.000	32.083	184.693	0.000	0.000
462	0.000	0.000	0.000	81.131	340.969	0.000	0.000
463	0.000	0.000	0.000	36.731	40.681	0.000	0.000
464	178.000	0.000	0.000	101.520	67.994	0.000	0.000
465	0.000	0.000	0.000	35.778	105.962	0.000	0.000
466	0.000	7.968	0.000	36.475	12.800	0.000	0.000
467	0.000	0.000	0.000	212.570	0.000	0.000	0.000
468	0.000	0.000	0.000	45.507	203.336	0.000	0.000
469	0.000	0.000	0.000	143.425	12.000	0.000	0.000
470	0.000	62.988	0.000	133.122	78.386	0.000	0.000
471	0.000	2.669	0.000	278.460	158.741	0.000	0.000
472	0.000	0.000	0.000	18.192	52.712	0.000	0.000
473	0.000	0.000	0.000	82.075	132.188	0.000	0.000
474	0.000	0.000	0.000	133.909	353.186	0.000	0.000
475	0.000	27.134	0.000	3.860	0.000	0.000	0.000
476	0.000	0.000	0.000	49.400	89.805	0.000	0.000
477	0.000	0.000	0.000	129.101	132.093	0.000	0.000
478	0.000	0.000	0.000	578.891	0.000	0.000	0.000
479	0.000	0.000	0.000	45.013	61.819	0.000	0.000
480	0.000	20.602	0.000	394.897	0.000	0.000	0.000
481	0.000	0.000	0.000	38.220	327.693	0.000	0.000
482	0.000	0.000	0.000	283.601	75.878	0.000	0.000
483	0.000	0.000	0.000	49.251	190.763	0.000	0.000
484	0.000	164.800	0.000	741.101	58.336	0.000	0.000
485	71.000	0.000	0.000	17.644	104.249	0.000	0.000
486	535.000	0.000	0.000	0.000	0.000	0.000	0.000
487	0.000	0.000	293.000	379.000	0.000	0.000	0.000
488	0.000	0.000	0.000	1,283.612	14.116	0.000	0.000
489	0.000	0.000	0.000	21.776	46.594	100.426	0.000
490	0.000	15.120	153.000	476.442	0.000	0.000	0.000
491	0.000	0.000	0.000	288.995	14.778	84.046	0.000
492	0.000	0.000	0.000	15.900	150.490	0.000	0.000
493	0.000	15.492	0.000	224.666	0.000	0.000	0.000
494	0.000	0.000	340.000	110.165	0.000	0.000	0.000
495	0.000	24.417	0.000	118.780	288.464	0.000	0.000
496	0.000	0.000	0.000	224.169	107.371	0.000	0.000
497	290.000	14.908	0.000	28.815	2.336	0.000	174.000
498	0.000	106.273	0.000	770.844	0.000	0.000	0.000
499	0.000	16.312	0.000	147.148	196.156	0.000	0.000
500	0.000	0.000	0.000	448.222	0.000	0.000	0.000
501	0.000	0.000	502.000	0.000	0.000	0.000	0.000
502	0.000	0.000	0.000	68.640	0.000	0.000	0.000
503	0.000	0.188	0.000	417.023	8.766	34.757	0.000
504	0.000	0.393	0.000	857.166	0.000	0.000	0.000
505	0.000	0.000	526.000	0.000	1.124	0.000	0.000
506	0.000	18.369	0.000	74.073	0.000	0.000	0.000

P2030 Cumulative Baseline No Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	**235**	**236**	**237**	**238**	**239**	**240**	**241**
507	0.000	0.000	0.000	93.840	0.000	0.000	0.000
508	0.000	0.000	0.000	0.000	0.000	0.000	0.000
509	0.000	3.267	0.000	834.141	0.000	64.547	0.000
510	0.000	12.039	0.000	1,126.485	0.000	0.000	0.000
511	0.000	12.011	215.000	65.945	0.000	0.000	0.000
512	0.000	0.000	0.000	114.729	0.000	0.000	0.000
513	0.000	0.000	0.000	94.006	1.600	0.000	0.000
514	0.000	32.660	0.000	24.100	0.000	0.000	0.000
515	0.000	0.000	0.000	0.000	0.000	0.000	0.000
516	114.000	127.419	0.000	966.224	0.000	0.000	0.000
517	0.000	0.000	0.000	7.354	81.647	0.000	0.000
518	0.000	0.000	0.000	111.172	0.000	0.000	0.000
519	0.000	0.000	293.000	0.000	0.000	0.000	0.000
520	0.000	0.000	0.000	74.633	0.000	0.000	0.000
521	0.000	0.000	0.000	260.979	63.252	0.000	0.000
522	0.000	9.450	0.000	96.222	0.000	0.000	0.000
523	118.000	0.000	0.000	1,682.996	0.000	0.000	0.000
524	0.000	0.000	0.000	413.395	0.000	0.000	0.000
525	0.000	0.000	0.000	452.828	202.253	0.000	0.000
526	261.000	3.000	0.000	65.858	0.000	0.000	0.000
527	0.000	0.000	0.000	0.000	0.000	0.000	0.000
528	0.000	0.000	0.000	25.828	143.727	0.000	0.000
529	0.000	0.000	0.000	68.771	108.037	0.000	0.000
530	0.000	0.000	0.000	91.438	0.000	0.000	0.000
531	0.000	0.000	0.000	137.700	0.000	0.000	0.000
532	825.000	0.000	0.000	0.000	0.100	0.000	0.000
533	0.000	0.000	0.000	44.065	1.193	0.000	0.000
534	0.000	8.850	0.000	466.156	1.665	0.000	0.000
535	0.000	0.000	0.000	0.000	0.000	0.000	0.000
536	0.000	0.000	0.000	38.105	22.824	0.000	0.000
537	0.000	20.962	0.000	69.724	0.000	0.000	0.000
538	0.000	15.772	0.000	339.810	12.000	0.000	0.000
539	0.000	0.000	0.000	62.392	20.366	0.000	0.000
540	617.000	0.000	0.000	0.000	0.000	0.000	0.000
541	0.000	0.000	0.000	74.771	0.000	0.000	0.000
542	0.000	35.635	0.000	77.798	0.779	0.000	0.000
543	0.000	8.500	0.000	110.109	17.536	0.000	0.000
544	1,809.000	11.343	0.000	0.000	0.000	0.000	0.000
545	0.000	16.325	0.000	80.681	82.557	0.000	0.000
546	0.000	68.820	0.000	1,351.829	18.310	0.000	0.000
Total	**5,011**	**1,341**	**2,322**	**26,381**	**14,701**	**348**	**174**

P2030 Cumulative With Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	235	236	237	238	239	240	241
395	0.000	0.000	0.000	206.572	357.706	0.000	0.000
396	0.000	0.000	0.000	253.602	408.746	0.000	0.000
397	0.000	22.109	0.000	107.291	243.813	0.000	0.000
398	0.000	12.052	0.000	81.093	168.382	0.000	0.000
399	0.000	0.000	0.000	255.529	289.499	0.000	0.000
400	0.000	0.000	0.000	176.669	551.910	0.000	0.000
401	0.000	0.000	0.000	178.824	231.849	0.000	0.000
402	0.000	0.000	0.000	112.123	136.185	0.000	0.000
403	0.000	237.693	0.000	91.261	18.610	0.000	0.000
404	0.000	0.000	0.000	390.178	156.914	0.000	0.000
405	0.000	0.000	0.000	195.340	224.252	0.000	0.000
406	0.000	0.000	0.000	67.367	129.081	0.000	0.000
407	0.000	0.000	0.000	50.517	117.130	0.000	0.000
408	0.000	0.910	0.000	203.894	132.687	0.000	0.000
409	0.000	0.000	0.000	261.087	156.347	0.000	0.000
410	142.000	0.000	0.000	58.917	97.785	0.000	0.000
411	192.000	5.000	0.000	336.213	362.318	0.000	0.000
412	0.000	0.000	0.000	74.634	120.728	0.000	0.000
413	0.000	0.000	0.000	230.368	251.333	0.000	0.000
414	0.000	4.330	0.000	278.900	319.852	0.000	132.000
415	0.000	0.000	0.000	72.505	70.180	0.000	0.000
416	0.000	4.000	0.000	113.071	209.514	0.000	0.000
417	142.000	0.000	0.000	103.609	0.000	0.000	0.000
418	0.000	0.000	0.000	155.307	158.835	0.000	0.000
419	0.000	0.000	0.000	6.731	69.440	0.000	0.000
420	169.000	0.000	0.000	130.522	240.009	0.000	0.000
421	337.000	0.000	0.000	119.995	30.372	0.000	0.000
422	1.000	0.000	0.000	267.563	253.044	64.280	0.000
423	0.000	0.000	0.000	260.783	0.000	0.000	0.000
424	0.000	0.000	0.000	96.625	158.715	0.000	0.000
425	364.000	0.000	0.000	196.808	0.232	0.000	0.000
426	0.000	1.760	0.000	320.276	79.691	0.000	0.000
427	0.000	0.000	0.000	77.041	59.674	0.000	0.000
428	0.000	1.902	0.000	103.026	175.770	0.000	0.000
429	270.000	0.000	0.000	129.790	164.608	0.000	0.000
430	0.000	0.000	0.000	455.361	166.265	0.000	0.000
431	297.000	1.930	0.000	90.256	192.833	0.000	0.000
432	0.000	0.000	0.000	90.064	43.919	0.000	0.000
433	135.000	0.000	0.000	28.586	78.877	0.000	0.000
434	0.000	0.000	0.000	140.297	146.061	0.000	0.000
435	0.000	0.000	0.000	41.643	67.700	0.000	0.000
436	0.000	0.000	0.000	192.847	75.073	0.000	0.000
437	0.000	0.600	0.000	168.516	45.696	0.000	0.000
438	203.000	0.000	0.000	138.033	208.405	0.000	0.000
439	0.000	0.000	0.000	300.646	384.005	0.000	0.000
440	243.000	0.000	0.000	11.211	59.119	0.000	0.000
441	0.000	30.965	0.000	134.284	187.637	0.000	0.000
442	203.000	0.000	0.000	21.787	42.750	0.000	0.000
443	0.000	20.562	0.000	66.785	6.094	0.000	0.000
444	0.000	0.000	0.000	42.205	26.561	0.000	0.000
445	235.000	0.000	0.000	41.065	28.829	0.000	0.000
446	615.000	10.000	0.000	55.600	131.435	0.000	0.000
447	0.000	3.724	0.000	41.371	115.050	0.000	0.000
448	0.000	13.900	0.000	106.519	30.581	0.000	0.000
449	0.000	0.000	0.000	97.994	188.995	0.000	0.000
450	0.000	0.000	0.000	24.887	126.562	0.000	0.000

P2030 Cumulative With Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	235	236	237	238	239	240	241
451	0.000	0.000	0.000	92.560	2.748	0.000	0.000
452	0.000	4.558	0.000	264.845	11.091	0.000	0.000
453	0.000	0.000	0.000	267.937	2.024	0.000	0.000
454	0.000	0.000	0.000	129.400	0.000	0.000	0.000
455	234.000	0.000	0.000	52.785	57.225	0.000	0.000
456	0.000	86.441	0.000	332.056	592.892	0.000	0.000
457	0.000	0.000	0.000	122.418	136.941	0.000	0.000
458	0.000	0.000	0.000	148.891	50.841	0.000	0.000
459	0.000	4.880	0.000	424.093	42.088	0.000	0.000
460	0.000	0.000	0.000	167.967	127.119	0.000	0.000
461	0.000	0.000	0.000	85.177	178.411	0.000	0.000
462	0.000	0.000	0.000	326.779	325.913	0.000	0.000
463	0.000	0.000	0.000	46.208	59.216	0.000	0.000
464	349.000	0.000	0.000	88.820	1.894	0.000	0.000
465	0.000	0.000	0.000	57.000	82.562	0.000	122.000
466	0.000	7.968	0.000	36.475	12.800	0.000	0.000
467	0.000	0.000	0.000	212.570	0.000	0.000	0.000
468	0.000	10.000	0.000	69.652	151.148	0.000	0.000
469	0.000	0.000	0.000	149.645	10.715	0.000	0.000
470	0.000	62.988	0.000	140.752	78.386	0.000	0.000
471	0.000	2.669	0.000	342.601	234.080	0.000	0.000
472	0.000	0.000	0.000	30.842	50.073	0.000	0.000
473	0.000	0.000	0.000	122.013	127.982	0.000	0.000
474	594.000	0.000	0.000	114.317	139.513	0.000	0.000
475	0.000	27.134	0.000	12.322	0.000	0.000	0.000
476	0.000	10.000	0.000	35.005	66.398	0.000	0.000
477	0.000	0.000	0.000	146.137	127.220	0.000	0.000
478	0.000	15.000	0.000	509.702	0.116	0.000	0.000
479	0.000	0.000	0.000	45.431	61.730	0.000	0.000
480	0.000	20.602	0.000	394.897	0.000	0.000	0.000
481	0.000	15.000	0.000	67.394	301.474	0.000	0.000
482	0.000	0.000	0.000	295.101	74.212	0.000	0.000
483	0.000	0.000	0.000	50.192	190.462	0.000	0.000
484	0.000	174.126	0.000	746.810	58.336	0.000	0.000
485	521.000	0.000	0.000	21.245	54.745	0.000	0.000
486	541.000	0.000	0.000	0.000	0.000	0.000	0.000
487	0.000	4.922	293.000	381.554	0.000	0.000	0.000
488	0.000	6.994	0.000	1,287.241	14.116	0.000	0.000
489	270.000	0.000	0.000	18.832	19.961	0.000	0.000
490	481.000	15.120	153.000	565.655	0.000	0.000	0.000
491	0.000	0.000	0.000	541.683	98.824	0.000	170.000
492	396.000	0.000	0.000	9.297	85.292	0.000	0.000
493	0.000	15.492	0.000	238.955	0.000	0.000	0.000
494	0.000	2.419	340.000	177.584	0.000	0.000	0.000
495	203.000	30.000	0.000	113.360	192.498	0.000	0.000
496	0.000	0.000	0.000	235.042	105.106	0.000	0.000
497	290.000	14.908	0.000	67.160	2.336	0.000	174.000
498	0.000	108.040	0.000	926.117	0.000	0.000	0.000
499	155.000	26.312	0.000	125.279	140.205	0.000	0.000
500	0.000	0.000	0.000	448.222	0.000	0.000	0.000
501	0.000	0.000	502.000	0.000	0.000	0.000	0.000
502	0.000	0.000	0.000	68.640	0.000	0.000	0.000
503	0.000	0.188	0.000	568.939	8.766	34.757	0.000
504	0.000	0.393	0.000	862.866	0.000	0.000	0.000
505	0.000	0.000	526.000	0.000	1.124	0.000	0.000
506	0.000	18.369	0.000	74.073	0.000	0.000	0.000

P2030 Cumulative With Project Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	**235**	**236**	**237**	**238**	**239**	**240**	**241**
507	0.000	0.000	0.000	93.840	0.000	0.000	0.000
508	827.000	0.000	0.000	0.000	0.000	0.000	0.000
509	0.000	3.267	0.000	838.199	0.000	64.547	0.000
510	0.000	12.039	0.000	1,129.961	0.000	0.000	0.000
511	0.000	12.011	215.000	85.899	0.000	0.000	0.000
512	0.000	0.000	0.000	126.048	0.000	0.000	0.000
513	0.000	0.000	0.000	94.006	1.600	0.000	0.000
514	0.000	32.660	0.000	79.100	0.000	0.000	0.000
515	553.000	19.700	0.000	90.000	0.000	0.000	0.000
516	232.000	177.419	154.000	1,432.885	0.000	0.000	0.000
517	0.000	0.000	0.000	37.354	81.647	0.000	0.000
518	0.000	0.000	0.000	376.339	0.000	0.000	0.000
519	0.000	0.000	293.000	0.000	0.000	0.000	0.000
520	0.000	0.000	0.000	74.633	0.000	0.000	0.000
521	0.000	0.000	0.000	289.746	63.252	0.000	0.000
522	0.000	30.450	0.000	797.349	15.000	0.000	0.000
523	1,776.000	172.581	154.000	2,264.885	0.000	0.000	0.000
524	0.000	0.000	0.000	413.395	0.000	0.000	0.000
525	0.000	0.000	0.000	467.128	202.253	0.000	0.000
526	459.000	3.000	0.000	65.858	0.000	0.000	0.000
527	156.000	0.000	0.000	0.000	0.000	0.000	0.000
528	0.000	7.750	0.000	495.000	0.000	0.000	0.000
529	0.000	0.000	0.000	99.759	108.037	0.000	0.000
530	319.000	0.000	0.000	1.000	0.000	0.000	0.000
531	0.000	0.000	0.000	137.700	0.000	0.000	0.000
532	825.000	0.000	0.000	2.174	0.100	0.000	0.000
533	0.000	0.000	0.000	45.289	1.193	0.000	0.000
534	211.000	8.850	0.000	406.794	1.665	0.000	0.000
535	0.000	33.750	250.000	487.130	0.000	0.000	0.000
536	0.000	0.000	0.000	44.098	22.824	0.000	0.000
537	386.000	0.000	0.000	1.000	0.000	0.000	0.000
538	0.000	15.772	0.000	339.810	12.000	0.000	0.000
539	0.000	0.000	0.000	86.238	20.366	0.000	0.000
540	617.000	0.000	0.000	0.000	0.000	0.000	0.000
541	286.000	0.000	0.000	0.579	0.061	0.000	0.000
542	0.000	35.635	0.000	98.570	0.779	0.000	0.000
543	596.000	7.900	0.000	0.000	0.000	0.000	0.000
544	1,809.000	11.343	0.000	266.088	0.000	0.000	0.000
545	404.000	22.100	0.000	70.375	54.177	0.000	0.000
546	0.000	68.820	0.000	1,462.817	18.310	0.000	0.000
Total	**17,038**	**1,731**	**2,880**	**33,716**	**13,180**	**164**	**598**

P2030 Cumulative Baseline + Existing General Plan Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	235	236	237	238	239	240	241
395	0.000	0.000	0.000	206.572	357.706	0.000	0.000
396	0.000	0.000	0.000	253.602	408.746	0.000	0.000
397	0.000	22.109	0.000	107.291	243.813	0.000	0.000
398	0.000	12.052	0.000	81.093	168.382	0.000	0.000
399	0.000	0.000	0.000	255.529	289.499	0.000	0.000
400	0.000	0.000	0.000	176.669	551.910	0.000	0.000
401	0.000	0.000	0.000	178.824	231.849	0.000	0.000
402	0.000	0.000	0.000	112.123	136.185	0.000	0.000
403	0.000	237.693	0.000	91.261	18.610	0.000	0.000
404	0.000	0.000	0.000	390.178	156.914	0.000	0.000
405	0.000	0.000	0.000	195.340	224.252	0.000	0.000
406	0.000	0.000	0.000	67.367	129.081	0.000	0.000
407	0.000	0.000	0.000	50.517	117.130	0.000	0.000
408	0.000	0.910	0.000	203.894	132.687	0.000	0.000
409	0.000	0.000	0.000	261.087	156.347	0.000	0.000
410	0.000	0.000	0.000	84.594	143.356	0.000	0.000
411	192.000	5.000	0.000	336.213	362.318	0.000	0.000
412	0.000	0.000	0.000	74.634	120.728	0.000	0.000
413	0.000	0.000	0.000	230.368	251.333	0.000	0.000
414	0.000	4.330	0.000	278.900	319.852	0.000	132.000
415	0.000	0.000	0.000	72.505	70.180	0.000	0.000
416	0.000	4.000	0.000	0.000	211.864	0.000	0.000
417	0.000	0.000	0.000	252.153	13.986	0.000	0.000
418	0.000	0.000	0.000	155.307	158.835	0.000	0.000
419	0.000	0.000	0.000	6.731	69.440	0.000	0.000
420	0.000	0.000	0.000	165.144	280.974	0.000	0.000
421	0.000	0.000	0.000	187.309	118.674	0.000	0.000
422	1.000	0.000	0.000	0.000	253.044	64.280	0.000
423	0.000	0.000	0.000	528.346	0.000	0.000	0.000
424	0.000	0.000	0.000	0.000	158.715	0.000	0.000
425	0.000	0.000	0.000	397.325	0.000	0.000	0.000
426	0.000	1.760	0.000	320.276	79.691	0.000	0.000
427	0.000	0.000	0.000	77.041	59.674	0.000	0.000
428	0.000	1.902	0.000	103.026	175.770	0.000	0.000
429	0.000	0.000	0.000	171.274	275.893	0.000	0.000
430	0.000	0.000	0.000	455.361	166.265	0.000	0.000
431	0.000	1.930	0.000	147.117	278.240	0.000	0.000
432	0.000	0.000	0.000	90.064	43.919	0.000	0.000
433	0.000	0.000	0.000	42.470	157.309	0.000	0.000
434	0.000	0.000	0.000	140.297	146.061	0.000	0.000
435	0.000	0.000	0.000	41.643	67.700	0.000	0.000
436	0.000	0.000	0.000	192.847	75.073	0.000	0.000
437	0.000	0.600	0.000	168.516	45.696	0.000	0.000
438	0.000	0.000	0.000	177.939	262.960	0.000	0.000
439	0.000	0.000	0.000	300.646	384.005	0.000	0.000
440	0.000	0.000	0.000	38.486	192.220	0.000	0.000
441	0.000	30.965	0.000	134.284	187.637	0.000	0.000
442	0.000	0.000	0.000	63.283	92.070	0.000	0.000
443	0.000	20.562	0.000	66.785	6.094	0.000	0.000
444	0.000	0.000	0.000	42.205	26.561	0.000	0.000
445	0.000	0.000	0.000	56.712	128.372	0.000	0.000
446	280.000	0.000	0.000	127.892	249.836	0.000	0.000
447	0.000	3.724	0.000	40.449	117.983	0.000	0.000
448	0.000	13.900	0.000	106.519	30.581	0.000	0.000
449	0.000	0.000	0.000	95.554	196.890	0.000	0.000
450	0.000	0.000	0.000	24.887	126.562	0.000	0.000

P2030 Cumulative Baseline + Existing General Plan Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	235	236	237	238	239	240	241
451	0.000	0.000	0.000	92.560	2.748	0.000	0.000
452	0.000	4.558	0.000	264.845	11.091	0.000	0.000
453	0.000	0.000	0.000	267.937	2.024	0.000	0.000
454	0.000	0.000	0.000	129.400	0.000	0.000	0.000
455	0.000	0.000	0.000	81.987	112.164	0.000	0.000
456	0.000	86.441	0.000	366.801	597.674	0.000	0.000
457	0.000	0.000	0.000	122.418	136.941	0.000	0.000
458	0.000	0.000	0.000	148.891	50.841	0.000	0.000
459	0.000	4.880	0.000	424.093	42.088	0.000	0.000
460	0.000	0.000	0.000	196.507	127.119	0.000	0.000
461	0.000	0.000	0.000	83.237	184.693	0.000	0.000
462	0.000	0.000	0.000	322.185	340.969	0.000	0.000
463	0.000	0.000	0.000	52.578	40.681	0.000	0.000
464	179.000	0.000	0.000	109.613	67.994	0.000	0.000
465	0.000	0.000	0.000	66.152	105.962	0.000	0.000
466	0.000	7.968	0.000	36.475	12.800	0.000	0.000
467	0.000	0.000	0.000	212.570	0.000	0.000	0.000
468	0.000	0.000	0.000	112.408	176.265	0.000	0.000
469	0.000	0.000	0.000	149.249	12.000	0.000	0.000
470	0.000	62.988	0.000	140.752	78.386	0.000	0.000
471	0.000	2.669	0.000	342.281	134.006	101.956	0.000
472	0.000	0.000	0.000	29.999	52.712	0.000	0.000
473	0.000	0.000	0.000	120.716	132.188	0.000	0.000
474	0.000	0.000	0.000	215.058	353.186	0.000	0.000
475	0.000	27.134	0.000	12.322	0.000	0.000	0.000
476	0.000	0.000	0.000	78.306	89.805	0.000	0.000
477	0.000	0.000	0.000	144.632	132.093	0.000	0.000
478	0.000	0.000	0.000	585.380	0.000	0.000	0.000
479	0.000	0.000	0.000	45.392	61.819	0.000	0.000
480	0.000	20.602	0.000	394.897	0.000	0.000	0.000
481	0.000	0.000	0.000	135.056	327.693	0.000	0.000
482	0.000	0.000	0.000	294.563	75.878	0.000	0.000
483	0.000	0.000	0.000	50.054	190.763	0.000	0.000
484	0.000	174.126	0.000	746.810	58.336	0.000	0.000
485	319.000	0.000	0.000	71.148	104.249	0.000	0.000
486	541.000	0.000	0.000	0.000	0.000	0.000	0.000
487	0.000	4.922	293.000	381.554	0.000	0.000	0.000
488	0.000	6.994	0.000	1,287.241	14.116	0.000	0.000
489	0.000	0.000	0.000	66.261	46.594	100.426	0.000
490	481.000	15.120	153.000	603.347	0.000	0.000	0.000
491	0.000	0.000	0.000	541.683	14.778	84.046	170.000
492	0.000	0.000	0.000	84.071	150.490	0.000	0.000
493	0.000	15.492	0.000	238.955	0.000	0.000	0.000
494	0.000	2.419	340.000	177.584	0.000	0.000	0.000
495	0.000	24.417	0.000	168.827	288.464	0.000	0.000
496	0.000	0.000	0.000	234.312	107.371	0.000	0.000
497	290.000	14.908	0.000	67.160	2.336	0.000	174.000
498	0.000	108.040	0.000	926.117	0.000	0.000	0.000
499	0.000	16.312	0.000	201.949	196.156	0.000	0.000
500	0.000	0.000	0.000	448.222	0.000	0.000	0.000
501	0.000	0.000	502.000	0.000	0.000	0.000	0.000
502	0.000	0.000	0.000	68.640	0.000	0.000	0.000
503	0.000	0.188	0.000	568.939	8.766	34.757	0.000
504	0.000	0.393	0.000	862.866	0.000	0.000	0.000
505	0.000	0.000	526.000	0.000	1.124	0.000	0.000
506	0.000	18.369	0.000	74.073	0.000	0.000	0.000

P2030 Cumulative Baseline + Existing General Plan Land Use for IBC Vision Plan

ITAM	Multi-family	Retail mix	Hotel	Office mix	Ind Mix	Mini-Ware	Ext Stay
TAZ	**235**	**236**	**237**	**238**	**239**	**240**	**241**
507	0.000	0.000	0.000	93.840	0.000	0.000	0.000
508	827.000	0.000	0.000	0.000	0.000	0.000	0.000
509	0.000	3.267	0.000	838.199	0.000	64.547	0.000
510	0.000	12.039	0.000	1,129.961	0.000	0.000	0.000
511	0.000	12.011	215.000	85.899	0.000	0.000	0.000
512	0.000	0.000	0.000	126.048	0.000	0.000	0.000
513	0.000	0.000	0.000	94.006	1.600	0.000	0.000
514	0.000	32.660	0.000	79.100	0.000	0.000	0.000
515	553.000	19.700	0.000	90.000	0.000	0.000	0.000
516	232.000	177.419	154.000	1,432.885	0.000	0.000	0.000
517	0.000	0.000	0.000	0.000	81.647	0.000	0.000
518	0.000	0.000	0.000	206.446	0.000	0.000	0.000
519	0.000	0.000	293.000	0.000	0.000	0.000	0.000
520	0.000	0.000	0.000	74.633	0.000	0.000	0.000
521	0.000	0.000	0.000	289.746	63.252	0.000	0.000
522	0.000	30.450	0.000	797.349	15.000	0.000	0.000
523	1,776.000	172.581	154.000	2,264.885	0.000	0.000	0.000
524	0.000	0.000	0.000	413.395	0.000	0.000	0.000
525	0.000	0.000	0.000	569.088	202.253	0.000	0.000
526	377.000	3.000	0.000	65.858	0.000	0.000	0.000
527	156.000	0.000	0.000	0.000	0.000	0.000	0.000
528	0.000	0.000	0.000	495.000	0.000	0.000	0.000
529	0.000	0.000	0.000	154.661	108.037	0.000	0.000
530	0.000	0.000	0.000	0.000	0.000	0.000	0.000
531	0.000	0.000	0.000	229.138	0.000	0.000	0.000
532	825.000	0.000	0.000	2.174	0.100	0.000	0.000
533	0.000	0.000	0.000	45.289	1.193	0.000	0.000
534	0.000	8.850	0.000	466.925	1.665	0.000	0.000
535	0.000	7.750	0.000	738.462	0.000	0.000	0.000
536	0.000	0.000	0.000	44.098	22.824	0.000	0.000
537	0.000	20.962	0.000	69.724	0.000	0.000	0.000
538	0.000	15.772	0.000	339.810	12.000	0.000	0.000
539	0.000	0.000	0.000	86.238	20.366	0.000	0.000
540	617.000	0.000	0.000	0.000	0.000	0.000	0.000
541	0.000	0.000	0.000	82.105	0.000	0.000	0.000
542	0.000	35.635	0.000	98.570	0.779	0.000	0.000
543	0.000	8.500	0.000	134.384	17.536	0.000	0.000
544	1,809.000	11.343	0.000	523.468	0.000	0.000	0.000
545	0.000	16.325	0.000	133.951	82.557	0.000	0.000
546	0.000	68.820	0.000	1,462.817	18.310	0.000	0.000
Total	**9,455**	**1,637**	**2,630**	**36,034**	**14,724**	**450**	**476**

IBC Vision Plan Database Snap Shot As Of July 10, 2009

Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
1	2152	ALTON PKWY	10,270	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	440	13.35	14.17	141.42	Fixed		in 2015
1	2182	ALTON PKWY	13,704	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	440	17.82	18.91	188.70	Fixed		in 2015
1	2152	ALTON PKWY	14,512	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	440	18.87	20.03	199.83	Fixed		in 2015
1	2182	ALTON PKWY	80,910	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	440	36.41	33.98	373.80	Fixed		in 2015
1	2152	ALTON PKWY	111,310	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	440	50.09	46.75	514.25	Fixed		in 2015
2	1212	ALTON PKWY	5,641	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	396	7.33	7.78	77.68	Fixed		in 2015
2	1212	ALTON PKWY	5,811	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	396	7.55	8.02	80.02	Fixed		
2	1212	ALTON PKWY	24,249	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	396	10.91	10.18	112.03	Fixed		in 2015
2	1431	MCGAW AVE	1,794	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	399	2.33	2.48	24.70	Fixed		in 2015
2	1452	ALTON PKWY	16,009	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	399	20.81	22.09	220.44	Fixed		in 2015
2	1402	ALTON PKWY	61,981	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	399	80.58	85.53	853.48	Fixed		in 2015
2	1	EDWARDS WAY	150,057	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	399	195.07	207.08	2,066.28	Fixed		
2	1431	MCGAW AVE	5,759	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	399	2.59	2.42	26.61	Fixed		in 2015
2	1452	ALTON PKWY	26,790	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	399	12.06	11.25	123.77	Fixed		in 2015
2	1441	MCGAW AVE	37,995	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	399	17.10	15.96	175.54	Fixed		in 2015
2	1402	ALTON PKWY	39,230	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	399	17.65	16.48	181.24	Fixed		in 2015
2	1	EDWARDS WAY	0	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	404	0.00	0.00	0.00	Fixed		
2	1435	MCGAW AVE	10,871	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	404	14.13	15.00	149.69	Fixed		in 2015
2	1441	MCGAW AVE	16,485	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	404	21.43	22.75	227.00	Fixed		
2	1441	MCGAW AVE	42,495	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	404	55.24	58.64	585.16	Fixed		in 2015
2	1	EDWARDS WAY	75,496	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	404	98.14	104.18	1,039.58	Fixed		in 2015
2	1	EDWARDS WAY	244,831	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	404	318.28	337.87	3,371.32	Fixed		
2	1	EDWARDS WAY	1,795	SF	Discretionary Approval	123	Manufacturing	PA36	5.1	IBC Multi-Use	404	0.81	0.75	8.29	Fixed		
2	1435	MCGAW AVE	55,093	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	404	24.79	23.14	254.53	Fixed		in 2015
2	1	EDWARDS WAY	100,026	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	404	45.01	42.01	462.12	Fixed		in 2015
3	1601	ALTON PKWY	6,529	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	402	8.49	9.01	89.90	Fixed		
3	1601	ALTON PKWY	60,762	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	402	78.99	83.85	836.69	Fixed		in 2015
3	1601	ALTON PKWY	105,090	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	402	47.29	44.14	485.52	Fixed		in 2015
4	1661	ALTON PKWY	19,154	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	402	24.90	26.43	263.75	Fixed		in 2015
4	1661	ALTON PKWY	25,678	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	402	33.38	35.44	353.59	Fixed		
4	1661	ALTON PKWY	31,095	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	402	13.99	13.06	143.66	Fixed		in 2015
5	1733	ALTON PKWY	78,733	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	409	102.35	108.65	1,084.15	Fixed		in 2015
6	1833	ALTON PKWY	128,265	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	409	166.74	177.01	1,766.21	Fixed		in 2015
7	1891	ALTON PKWY	3,249	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	409	4.22	4.48	44.74	Fixed		in 2015
7	1891	ALTON PKWY	14,269	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	409	18.55	19.69	196.48	Fixed		
7	1891	ALTON PKWY	67,291	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	409	30.28	28.26	310.88	Fixed		in 2015
8	1921	ALTON PKWY	4,011	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	409	5.21	5.54	55.23	Fixed		in 2015
8	1921	ALTON PKWY	7,333	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	409	9.53	10.12	100.98	Fixed		
8	1921	ALTON PKWY	31,752	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	409	14.29	13.34	146.69	Fixed		in 2015
9	1923	ALTON PKWY	1,836	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	409	2.39	2.53	25.28	Fixed		in 2015
9	1923	ALTON PKWY	7,246	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	409	9.42	10.00	99.78	Fixed		
9	1923	ALTON PKWY	22,258	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	409	10.02	9.35	102.83	Fixed		in 2015
10	2025	ALTON PKWY	19,473	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	421	25.31	26.87	268.14	Redev	Non-Res Optimization	
10	2025	ALTON PKWY	35,329	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	421	45.93	48.75	486.48	Redev	Non-Res Optimization	
10	2025	ALTON PKWY	53,674	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	421	24.15	22.54	247.97	Redev	Non-Res Optimization	
11	2072	ALTON PKWY	5,480	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	433	7.12	7.56	75.46	Redev	Non-Res Optimization	
11	2102	ALTON PKWY	11,140	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	433	14.48	15.37	153.40	Redev	Non-Res Optimization	
11	2052	ALTON PKWY	12,466	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	433	16.21	17.20	171.66	Redev	Non-Res Optimization	
11	2052	ALTON PKWY	13,384	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	433	17.40	18.47	184.30	Redev	Non-Res Optimization	
11	2052	ALTON PKWY	25,729	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	433	11.58	10.81	118.87	Redev	Non-Res Optimization	
11	2072	ALTON PKWY	52,520	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	433	23.63	22.06	242.64	Redev	Non-Res Optimization	
11	2102	ALTON PKWY	79,060	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	433	35.58	33.21	365.26	Redev	Non-Res Optimization	
12	16715	VON KARMAN AVE	109	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	417	0.14	0.15	1.50	Redev	Non-Res Optimization	
12	16735	VON KARMAN AVE	36,473	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	417	47.41	50.33	502.23	Redev	Non-Res Optimization	
12	16755	VON KARMAN AVE	47,717	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	417	62.03	65.85	657.06	Redev	Non-Res Optimization	
12	16715	VON KARMAN AVE	55,479	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	417	72.12	76.56	763.95	Redev	Non-Res Optimization	
12	16715	VON KARMAN AVE	13,986	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	417	6.29	5.87	64.62	Redev	Non-Res Optimization	
12	16775	VON KARMAN AVE	33,200	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	425	43.16	45.82	457.16	Redev	Non-Res Optimization	
12	16845	VON KARMAN AVE	43,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	425	55.90	59.34	592.11	Redev	Non-Res Optimization	
12	16795	VON KARMAN AVE	51,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	425	66.30	70.38	702.27	Redev	Non-Res Optimization	
12	16815	VON KARMAN AVE	51,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	425	66.30	70.38	702.27	Redev	Non-Res Optimization	
12	2121	ALTON PKWY	53,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	425	68.90	73.14	729.81	Redev	Non-Res Optimization	
12	16969	VON KARMAN AVE	69,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	425	90.35	95.91	957.02	Redev	Non-Res Optimization	
13	2201	ALTON PKWY	12,585	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	429	16.36	17.37	173.30	Redev	Non-Res Optimization	
13	16940	VON KARMAN AVE	14,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	429	18.85	20.01	199.67	Redev	Non-Res Optimization	
13	2201	ALTON PKWY	10,375	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	4.67	4.36	47.93	Redev	Non-Res Optimization	
13	16940	VON KARMAN AVE	11,400	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	5.13	4.79	52.67	Redev	Non-Res Optimization	
14	2215	ALTON PKWY	657	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	429	0.85	0.91	9.05	Fixed		
14	2215	ALTON PKWY	5,449	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	429	7.08	7.52	75.03	Fixed		
14	2215	ALTON PKWY	76,437	SF	Discretionary Approval	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	34.40	32.10	353.14	Fixed		
15	2206	ALTON PKWY	761	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	445	0.99	1.05	10.48	Redev	Non-Res Optimization	
15	2206	ALTON PKWY	11,577	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	445	15.05	15.98	159.42	Redev	Non-Res Optimization	
15	2206	ALTON PKWY	30,317	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	445	13.64	12.73	140.06	Redev	Non-Res Optimization	
16	2481	ALTON PKWY	2,498	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	438	3.25	3.45	34.40	Redev	Res Potential	
16	2481	ALTON PKWY	10,100	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	438	13.13	13.94	139.08	Redev	Res Potential	
16	2481	ALTON PKWY	34,490	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	15.52	14.49	159.34	Redev	Res Potential	
17	2501	ALTON PKWY	24,660	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	438	32.06	34.03	339.57	Redev	Res Potential	
18	2777	ALTON PKWY	1	DU	Density Bonus/Discretionary Approval	103	Apartments	PA36	5.3C	IBC Residential	446	0.50	0.52	6.30	Fixed		in 2015
18	2777	ALTON PKWY	55	DU	Density Bonus/Permits Issued	103	Apartments	PA36	5.3C	IBC Residential	446	27.50	28.60	346.50	Fixed		in 2015
18	2777	ALTON PKWY	224	DU	Permits Issued	103	Apartments	PA36	5.3C	IBC Residential	446	112.00	116.48	1,411.20	Fixed		in 2015
19	2851	ALTON PKWY	170	DU	Pending Approval	102	Condominiums	PA36	5.1	IBC Residential	464	85.00	88.40	1,071.00	Fixed		in 2015
19	2851	ALTON PKWY	-12,700	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	464	-16.51	-17.53	-174.88	Fixed		
19	2851	ALTON PKWY	-8,093	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	464	-10.52	-11.17	-111.44	Fixed		

IBC Vision Plan Database Snap Shot As Of July 10, 2009

Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
19	2851	ALTON PKWY	8,093	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	464	10.52	11.17	111.44	Fixed		
19	2851	ALTON PKWY	12,700	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	464	16.51	17.53	174.88	Fixed		in 2015
19	2851	ALTON PKWY	-66,100	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	464	-29.75	-27.76	-305.38	Fixed		
19	2851	ALTON PKWY	66,100	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	464	29.75	27.76	305.38	Fixed		in 2015
20	16601	ARMSTRONG AVE	2,657	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	397	3.45	3.67	36.59	Fixed		
20	16601	ARMSTRONG AVE	11,470	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	397	14.91	15.83	157.94	Fixed		in 2015
20	16601	ARMSTRONG AVE	21,258	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	397	9.57	8.93	98.21	Fixed		in 2015
21	16680	ARMSTRONG AVE	8,484	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	410	11.03	11.71	116.82	Redev	Non-Res Optimization	
21	16680	ARMSTRONG AVE	25,165	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	410	32.71	34.73	346.52	Redev	Non-Res Optimization	
21	16680	ARMSTRONG AVE	77,415	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	410	34.84	32.51	357.66	Redev	Non-Res Optimization	
22	16752	ARMSTRONG AVE	15,659	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	410	20.36	21.61	215.62	Redev	Non-Res Optimization	
22	16752	ARMSTRONG AVE	35,286	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	410	45.87	48.69	485.89	Redev	Non-Res Optimization	
22	16752	ARMSTRONG AVE	65,941	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	410	29.67	27.70	304.65	Redev	Non-Res Optimization	
23	16808	ARMSTRONG AVE	102,910	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	421	133.78	142.02	1,417.07	Redev	Non-Res Optimization	
24	16841	ARMSTRONG AVE	4,854	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	405	6.31	6.70	66.84	Fixed		
24	16841	ARMSTRONG AVE	13,450	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	405	17.49	18.56	185.21	Fixed		in 2015
24	16841	ARMSTRONG AVE	13,810	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	405	6.21	5.80	63.80	Fixed		in 2015
25	16881	ARMSTRONG AVE	3,600	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	405	4.68	4.97	49.57	Fixed		in 2015
25	16881	ARMSTRONG AVE	8,566	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	405	11.14	11.82	117.95	Fixed		
25	16881	ARMSTRONG AVE	20,150	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	405	9.07	8.46	93.09	Fixed		in 2015
26	16882	ARMSTRONG AVE	7,800	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	421	10.14	10.76	107.41	Redev	Non-Res Optimization	
26	16882	ARMSTRONG AVE	21,797	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	421	28.34	30.08	300.14	Redev	Non-Res Optimization	
26	16882	ARMSTRONG AVE	65,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	421	29.25	27.30	300.30	Redev	Non-Res Optimization	
27	16901	ARMSTRONG AVE	6,776	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	409	8.81	9.35	93.31	Fixed		in 2015
27	16901	ARMSTRONG AVE	9,369	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	409	12.18	12.93	129.01	Fixed		
27	16901	ARMSTRONG AVE	35,046	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	409	15.77	14.72	161.91	Fixed		in 2015
28	17032	ARMSTRONG AVE	35,021	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	427	45.53	48.33	482.24	Fixed		in 2015
30	17101	ARMSTRONG AVE	4,179	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	418	5.43	5.77	57.54	Fixed		
30	17101	ARMSTRONG AVE	44,106	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	418	57.34	60.87	607.34	Fixed		in 2015
30	17101	ARMSTRONG AVE	12,778	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	418	5.75	5.37	59.03	Fixed		in 2015
31	17112	ARMSTRONG AVE	20,482	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	427	26.63	28.27	282.04	Fixed		in 2015
31	17112	ARMSTRONG AVE	21,538	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	427	28.00	29.72	296.58	Fixed		
31	17112	ARMSTRONG AVE	59,674	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	427	26.85	25.06	275.69	Fixed		in 2015
32	17152	ARMSTRONG AVE	347	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	435	0.45	0.48	4.78	Fixed		
32	17152	ARMSTRONG AVE	11,230	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	435	14.60	15.50	154.64	Fixed		in 2015
32	17152	ARMSTRONG AVE	33,845	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	435	15.23	14.21	156.36	Fixed		in 2015
33	17182	ARMSTRONG AVE	19,516	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	435	25.37	26.93	268.74	Fixed		
33	17182	ARMSTRONG AVE	5,222	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	435	2.35	2.19	24.13	Fixed		in 2015
34	17191	ARMSTRONG AVE	4,750	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	424	6.18	6.56	65.41	Fixed		in 2015
34	17191	ARMSTRONG AVE	13,435	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	424	6.05	5.64	62.07	Fixed		in 2015
35	17222	ARMSTRONG AVE	809	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	435	1.05	1.12	11.14	Fixed		
35	17222	ARMSTRONG AVE	4,809	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	435	6.25	6.64	66.22	Fixed		in 2015
35	17222	ARMSTRONG AVE	6,711	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	435	3.02	2.82	31.00	Fixed		in 2015
36	17252	ARMSTRONG AVE	30,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	444	39.00	41.40	413.10	Fixed		in 2015
37	17352	ARMSTRONG AVE	1,646	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	450	2.14	2.27	22.67	Fixed		
37	17352	ARMSTRONG AVE	8,378	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	450	10.89	11.56	115.37	Fixed		in 2015
37	17352	ARMSTRONG AVE	113,274	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	450	50.97	47.58	523.33	Fixed		in 2015
38	17361	ARMSTRONG AVE	11,070	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	14.39	15.28	152.43	Fixed		in 2015
39	17422	ARMSTRONG AVE	6,551	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	450	8.52	9.04	90.21	Fixed		
39	17422	ARMSTRONG AVE	8,312	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	450	10.81	11.47	114.46	Fixed		in 2015
39	17422	ARMSTRONG AVE	13,288	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	450	5.98	5.58	61.39	Fixed		in 2015
40	17462	ARMSTRONG AVE	1,808	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	460	2.35	2.50	24.90	Fixed		
40	17462	ARMSTRONG AVE	7,975	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	460	10.37	11.01	109.82	Fixed		in 2015
40	17462	ARMSTRONG AVE	31,920	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	460	14.36	13.41	147.47	Fixed		in 2015
41	17522	ARMSTRONG AVE	35,807	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	460	46.55	49.41	493.06	Fixed		in 2015
41	17522	ARMSTRONG AVE	74,207	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	460	96.47	102.41	1,021.83	Fixed		
41	17522	ARMSTRONG AVE	74,699	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	460	33.61	31.37	345.11	Fixed		in 2015
42	17511	ARMSTRONG AVE	37,611	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	439	48.89	51.90	517.90	Fixed		in 2015
42	17511	ARMSTRONG AVE	23,304	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	439	10.49	9.79	107.66	Fixed		in 2015
42	17511	ARMSTRONG AVE	24,454	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	439	11.00	10.27	112.98	Fixed		in 2015
43	17572	ARMSTRONG AVE	48,170	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	460	62.62	66.47	663.30	Fixed		
43	17572	ARMSTRONG AVE	20,500	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	460	9.23	8.61	94.71	Fixed		in 2015
44	17622	ARMSTRONG AVE	499	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	465	0.65	0.69	6.87	Fixed		
44	17622	ARMSTRONG AVE	17,906	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	465	23.28	24.71	246.57	Fixed		in 2015
44	17622	ARMSTRONG AVE	6,194	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	465	2.79	2.60	28.62	Fixed		in 2015
45	17611	ARMSTRONG AVE	5,214	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	439	6.78	7.20	71.80	Fixed		in 2015
45	17611	ARMSTRONG AVE	9,600	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	439	12.48	13.25	132.19	Fixed		
45	17611	ARMSTRONG AVE	16,098	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	439	7.24	6.76	74.37	Fixed		in 2015
46	17632	ARMSTRONG AVE	1,936	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	465	2.52	2.67	26.66	Fixed		in 2015
46	17632	ARMSTRONG AVE	8,450	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	465	10.99	11.66	116.36	Fixed		
46	17632	ARMSTRONG AVE	30,160	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	465	13.57	12.67	139.34	Fixed		in 2015
47	17642	ARMSTRONG AVE	3,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	465	3.90	4.14	41.31	Fixed		in 2015
47	17642	ARMSTRONG AVE	11,500	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	465	14.95	15.87	158.36	Fixed		
47	17642	ARMSTRONG AVE	27,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	465	12.15	11.34	124.74	Fixed		in 2015
48	17651	ARMSTRONG AVE	5,224	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	439	6.79	7.21	71.93	Fixed		in 2015
48	17651	ARMSTRONG AVE	6,005	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	439	7.81	8.29	82.69	Fixed		
48	17651	ARMSTRONG AVE	24,776	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	439	11.15	10.41	114.47	Fixed		in 2015
49	17662	ARMSTRONG AVE	-6,000	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	465	-7.80	-8.28	-82.62	Fixed		
49	17662	ARMSTRONG AVE	-3,152	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	465	-4.10	-4.35	-43.40	Fixed		
49	17662	ARMSTRONG AVE	3,152	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	465	4.10	4.35	43.40	Fixed		
49	17662	ARMSTRONG AVE	6,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	465	7.80	8.28	82.62	Fixed		in 2015
49	17662	ARMSTRONG AVE	-23,400	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	465	-10.53	-9.83	-108.11	Fixed		
49	17662	ARMSTRONG AVE	23,400	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	465	10.53	9.83	108.11	Fixed		in 2015

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
49	17662	ARMSTRONG AVE	122	ROOM	Pending Approval	162	Hotel-Extended Stay	PA36	5.1	IBC Multi-Use	465	46.36	51.24	627.08	Fixed		in 2015
50	17671	ARMSTRONG AVE	12,415	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	439	16.14	17.13	170.95	Fixed		
50	17671	ARMSTRONG AVE	40,700	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	439	18.32	17.09	188.03	Fixed		in 2015
51	17672	ARMSTRONG AVE	6,773	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	465	8.80	9.35	93.26	Fixed		
51	17672	ARMSTRONG AVE	6,936	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	465	9.02	9.57	95.51	Fixed		in 2015
51	17672	ARMSTRONG AVE	19,208	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	465	8.64	8.07	88.74	Fixed		in 2015
52	16580	ASTON ST	1,184	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	397	1.54	1.63	16.30	Fixed		
52	16500	ASTON ST	4,099	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	397	5.33	5.66	56.44	Fixed		
52	16500	ASTON ST	10,197	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	397	13.26	14.07	140.41	Fixed		in 2015
52	16580	ASTON ST	3,987	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	397	1.79	1.67	18.42	Fixed		in 2015
52	16500	ASTON ST	61,675	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	397	27.75	25.90	284.94	Fixed		in 2015
53	1771	DEERE AVE	8,635	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	401	11.23	11.92	118.90	Fixed		in 2015
53	16700	ASTON ST	21,462	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	401	27.90	29.62	295.53	Fixed		in 2015
53	1771	DEERE AVE	30,724	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	401	39.94	42.40	423.07	Fixed		
53	1791	DEERE AVE	46,038	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	401	59.85	63.53	633.94	Fixed		in 2015
53	1791	DEERE AVE	56,417	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	401	25.39	23.70	260.65	Fixed		in 2015
53	1771	DEERE AVE	80,551	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	401	36.25	33.83	372.15	Fixed		in 2015
54	16800	ASTON ST	47,890	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	405	62.26	66.09	659.45	Fixed		in 2015
54	16802	ASTON ST	62,314	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	405	81.01	85.99	858.06	Fixed		in 2015
56	18771	TELLER AVE	596	DU	Pending Approval	102	Condominiums	PA36	5.1	IBC Multi-Use	543	298.00	309.92	3,754.80	Fixed		in 2015
56	18871	TELLER AVE	-8,500	SF	RA Future Demo	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	543	-21.59	-59.16	-714.00	Fixed		
56	18771	TELLER AVE	7,900	SF	Pending Approval	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	543	20.07	54.98	663.60	Fixed		
56	18871	TELLER AVE	8,500	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	543	21.59	59.16	714.00	Fixed		in 2015
56	18902	BARDEEN AVE	-14,750	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	543	-19.18	-20.36	-203.11	Fixed		
56	18872	BARDEEN AVE	-11,383	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	543	-14.80	-15.71	-156.74	Fixed		
56	18871	TELLER AVE	-6,606	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	543	-8.59	-9.12	-90.96	Fixed		
56	18871	TELLER AVE	-1,986	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	543	-2.58	-2.74	-27.35	Fixed		
56	18871	TELLER AVE	1,986	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	543	2.58	2.74	27.35	Fixed		in 2015
56	18871	TELLER AVE	6,606	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	543	8.59	9.12	90.96	Fixed		
56	18872	BARDEEN AVE	11,383	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	543	14.80	15.71	156.74	Fixed		in 2015
56	18902	BARDEEN AVE	14,750	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	543	19.18	20.36	203.11	Fixed		in 2015
56	18871	TELLER AVE	-13,112	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	543	-5.90	-5.51	-60.58	Fixed		
56	18872	BARDEEN AVE	-2,102	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	543	-0.95	-0.88	-9.71	Fixed		
56	18902	BARDEEN AVE	-1,200	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	543	-0.54	-0.50	-5.54	Fixed		
56	18902	BARDEEN AVE	1,200	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	543	0.54	0.50	5.54	Fixed		in 2015
56	18872	BARDEEN AVE	2,102	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	543	0.95	0.88	9.71	Fixed		in 2015
56	18871	TELLER AVE	13,112	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	543	5.90	5.51	60.58	Fixed		in 2015
57	1600	BARRANCA PKWY	11,375	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	395	14.79	15.70	156.63	Fixed		in 2015
57	1600	BARRANCA PKWY	92,725	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	395	120.54	127.96	1,276.82	Fixed		
57	1600	BARRANCA PKWY	206,300	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	395	92.84	86.65	953.11	Fixed		in 2015
58	1700	BARRANCA PKWY	4,860	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	397	6.32	6.71	66.92	Fixed		in 2015
58	1700	BARRANCA PKWY	16,551	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	397	21.52	22.84	227.91	Fixed		
58	1700	BARRANCA PKWY	34,400	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	397	15.48	14.45	158.93	Fixed		in 2015
59	1842	BARRANCA PKWY	412	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	397	0.54	0.57	5.67	Fixed		
59	1842	BARRANCA PKWY	9,271	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	397	12.05	12.79	127.66	Fixed		in 2015
59	1842	BARRANCA PKWY	15,729	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	397	7.08	6.61	72.67	Fixed		in 2015
60	1924	BARRANCA PKWY	1,749	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	397	2.27	2.41	24.08	Fixed		in 2015
60	1922	BARRANCA PKWY	6,768	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	397	8.80	9.34	93.20	Fixed		in 2015
60	1922	BARRANCA PKWY	36,674	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	397	47.68	50.61	505.00	Fixed		
60	1924	BARRANCA PKWY	34,908	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	397	15.71	14.66	161.27	Fixed		in 2015
60	1922	BARRANCA PKWY	69,144	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	397	31.11	29.04	319.45	Fixed		in 2015
61	1962	BARRANCA PKWY	22,109	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	397	56.16	153.88	1,857.16	Fixed		in 2015
61	1962	BARRANCA PKWY	1,399	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	397	1.82	1.93	19.26	Fixed		in 2015
61	1962	BARRANCA PKWY	2,712	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	397	1.22	1.14	12.53	Fixed		in 2015
62	2190	BARRANCA PKWY	2,500	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	403	6.35	17.40	210.00	Fixed		in 2015
62	2222	BARRANCA PKWY	2,554	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	403	6.49	17.78	214.54	Fixed		in 2015
62	2200	BARRANCA PKWY	3,200	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	403	8.13	22.27	268.80	Fixed		in 2015
62	2244	BARRANCA PKWY	4,750	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	403	12.07	33.06	399.00	Fixed		in 2015
62	16585	VON KARMAN AVE	9,100	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	403	23.11	63.34	764.40	Fixed		in 2015
62	16525	VON KARMAN AVE	14,115	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	403	35.85	98.24	1,185.66	Fixed		in 2015
62	16575	VON KARMAN AVE	15,000	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	403	38.10	104.40	1,260.00	Fixed		in 2015
62	2120	BARRANCA PKWY	84,574	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	403	214.82	588.64	7,104.22	Fixed		in 2015
62	16555	VON KARMAN AVE	101,900	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	403	258.83	709.22	8,559.60	Fixed		in 2015
62	0	VON KARMAN AVE	34,615	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	403	45.00	47.77	476.65	Fixed		
62	2120	BARRANCA PKWY	56,646	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	403	73.64	78.17	780.02	Fixed		
62	2120	BARRANCA PKWY	2,730	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	403	1.23	1.15	12.61	Fixed		in 2015
62	16555	VON KARMAN AVE	15,880	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	403	7.15	6.67	73.37	Fixed		in 2015
63	2302	BARRANCA PKWY	4,000	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	416	10.16	27.84	336.00	Redev	Non-Res Optimization	
63	2302	BARRANCA PKWY	2,632	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	416	3.42	3.63	36.24	Redev	Non-Res Optimization	
63	2302	BARRANCA PKWY	22,558	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	416	10.15	9.47	104.22	Redev	Non-Res Optimization	
64	2332	BARRANCA PKWY	2,583	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	416	3.36	3.56	35.57	Redev	Non-Res Optimization	
64	2332	BARRANCA PKWY	21,641	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	416	28.13	29.86	298.00	Redev	Non-Res Optimization	
64	2332	BARRANCA PKWY	27,417	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	416	12.34	11.52	126.67	Redev	Non-Res Optimization	
65	2400	BARRANCA PKWY	21,838	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	420	28.39	30.14	300.71	Fixed		
65	2400	BARRANCA PKWY	22,172	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	420	28.82	30.60	305.31	Fixed		in 2015
65	2400	BARRANCA PKWY	32,862	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	420	14.79	13.80	151.82	Fixed		in 2015
66	2801	BARRANCA PKWY	27,577	SF	Existing	121	Office	PA36	5.2	IBC Industrial	411	35.85	38.06	379.74	Fixed		in 2015
66	2801	BARRANCA PKWY	30,409	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	13.68	12.77	140.49	Fixed		in 2015
67	2805	BARRANCA PKWY	2,069	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	2.69	2.86	28.49	Fixed		
67	2805	BARRANCA PKWY	7,694	SF	Existing	121	Office	PA36	5.2	IBC Industrial	411	10.00	10.62	105.95	Fixed		in 2015
67	2805	BARRANCA PKWY	7,416	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	3.34	3.11	34.26	Fixed		in 2015
68	2807	BARRANCA PKWY	2,700	SF	Existing	121	Office	PA36	5.2	IBC Industrial	411	3.51	3.73	37.18	Fixed		in 2015
68	2807	BARRANCA PKWY	5,927	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	7.71	8.18	81.61	Fixed		

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
68	2807	BARRANCA PKWY	27,456	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	12.36	11.53	126.85	Fixed		in 2015
69	16661	JAMBOREE RD	4,055	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	431	5.27	5.60	55.84	Redev	Res Potential	
69	16661	JAMBOREE RD	10,451	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	431	13.59	14.42	143.91	Redev	Res Potential	
69	16661	JAMBOREE RD	53,649	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	431	24.14	22.53	247.86	Redev	Res Potential	
70	2692	BECKMAN AVE	24,615	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	431	32.00	33.97	338.95	Redev	Res Potential	
70	2692	BECKMAN AVE	43,199	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	431	19.44	18.14	199.58	Redev	Res Potential	
71	40	PALATINE	95	DU	Existing	103	Apartments	PA36	5.3	IBC Residential	532	47.50	49.40	598.50	Fixed		in 2015
71	70	PALATINE	104	DU	Existing	103	Apartments	PA36	5.3	IBC Residential	532	52.00	54.08	655.20	Fixed		in 2015
71	50	PALATINE	112	DU	Existing	103	Apartments	PA36	5.3	IBC Residential	532	56.00	58.24	705.60	Fixed		in 2015
71	60	PALATINE	112	DU	Existing	103	Apartments	PA36	5.3	IBC Residential	532	56.00	58.24	705.60	Fixed		in 2015
71	45	PALATINE	201	DU	Existing	103	Apartments	PA36	5.3	IBC Residential	532	100.50	104.52	1,266.30	Fixed		in 2015
71	65	PALATINE	201	DU	Existing	103	Apartments	PA36	5.3	IBC Residential	532	100.50	104.52	1,266.30	Fixed		in 2015
71	30	PALATINE	192	DU	Existing	103	Apartments	PA36	5.3	IBC Residential	540	96.00	99.84	1,209.60	Fixed		in 2015
71	25	PALATINE	209	DU	Existing	103	Apartments	PA36	5.3	IBC Residential	540	104.50	108.68	1,316.70	Fixed		in 2015
71	20	PALATINE	216	DU	Existing	103	Apartments	PA36	5.3	IBC Residential	540	108.00	112.32	1,360.80	Fixed		in 2015
72	1581	BROWNING	796	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	398	1.03	1.10	10.96	Fixed		in 2015
72	1581	BROWNING	4,167	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	398	5.42	5.75	57.38	Fixed		
72	1581	BROWNING	12,435	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	398	5.60	5.22	57.45	Fixed		in 2015
73	1582	BROWNING	994	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	398	1.29	1.37	13.69	Fixed		
73	1582	BROWNING	3,018	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	398	3.92	4.16	41.56	Fixed		in 2015
73	1582	BROWNING	12,981	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	398	5.84	5.45	59.97	Fixed		in 2015
74	1621	BROWNING	7,058	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	398	9.18	9.74	97.19	Fixed		in 2015
74	1621	BROWNING	9,142	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	398	4.11	3.84	42.24	Fixed		in 2015
75	1622	BROWNING	1,259	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	398	1.64	1.74	17.34	Fixed		in 2015
75	1622	BROWNING	1,759	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	398	2.29	2.43	24.22	Fixed		
75	1622	BROWNING	14,563	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	398	6.55	6.12	67.28	Fixed		in 2015
76	1651	BROWNING	321	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	398	0.42	0.44	4.42	Fixed		
76	1651	BROWNING	2,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	398	3.25	3.45	34.43	Fixed		in 2015
76	1651	BROWNING	15,100	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	398	6.80	6.34	69.76	Fixed		in 2015
77	1652	BROWNING	796	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	398	1.03	1.10	10.96	Fixed		in 2015
77	1652	BROWNING	2,062	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	398	2.68	2.85	28.39	Fixed		
77	1652	BROWNING	15,024	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	398	6.76	6.31	69.41	Fixed		in 2015
78	1691	BROWNING	1,578	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	398	2.05	2.18	21.73	Fixed		
78	1691	BROWNING	8,134	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	398	10.57	11.22	112.01	Fixed		in 2015
78	1691	BROWNING	5,296	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	398	2.38	2.22	24.47	Fixed		in 2015
79	1692	BROWNING	377	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	398	0.49	0.52	5.19	Fixed		
79	1692	BROWNING	6,880	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	398	8.94	9.49	94.74	Fixed		in 2015
79	1692	BROWNING	6,620	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	398	2.98	2.78	30.58	Fixed		in 2015
80	2021	BUSINESS CENTER DR	62,700	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	493	81.51	86.53	863.38	Fixed		in 2015
81	2042	BUSINESS CENTER DR	12,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	506	15.60	16.56	165.24	Fixed		in 2015
82	2062	BUSINESS CENTER DR	16,100	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	502	20.93	22.22	221.70	Fixed		in 2015
83	2070	BUSINESS CENTER DR	16,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	502	20.80	22.08	220.32	Fixed		in 2015
84	2081	BUSINESS CENTER DR	48,444	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	493	62.98	66.85	667.07	Fixed		in 2015
85	2101	BUSINESS CENTER DR	1,179	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	493	1.53	1.63	16.23	Fixed		
85	2101	BUSINESS CENTER DR	18,296	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	493	23.78	25.25	251.94	Fixed		in 2015
86	2082	BUSINESS CENTER DR	36,540	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	502	47.50	50.43	503.16	Fixed		in 2015
87	2091	BUSINESS CENTER DR	769	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	493	1.00	1.06	10.59	Fixed		
87	2091	BUSINESS CENTER DR	18,296	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	493	23.78	25.25	251.94	Fixed		in 2015
88	2102	BUSINESS CENTER DR	1,179	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	493	1.53	1.63	16.23	Fixed		
88	2102	BUSINESS CENTER DR	46,776	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	493	60.81	64.55	644.11	Fixed		in 2015
89	2111	BUSINESS CENTER DR	615	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	493	0.80	0.85	8.47	Fixed		
89	2111	BUSINESS CENTER DR	17,504	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	493	22.76	24.16	241.03	Fixed		in 2015
90	2112	BUSINESS CENTER DR	1,179	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	493	1.53	1.63	16.23	Fixed		
90	2112	BUSINESS CENTER DR	12,650	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	493	16.45	17.46	174.19	Fixed		in 2015
91	2171	CAMPUS DR	35,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	530	46.15	48.99	488.84	Redev	Res Potential	
92	2301	CAMPUS DR	20,962	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	537	53.24	145.90	1,760.81	Redev	Res Potential	
92	2301	CAMPUS DR	23,724	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	537	30.84	32.74	326.68	Redev	Res Potential	
93	2361	CAMPUS DR	46,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	537	59.80	63.48	633.42	Redev	Res Potential	
94	2415	CAMPUS DR	7,334	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	541	9.53	10.12	100.99	Redev	Res Potential	
94	2415	CAMPUS DR	33,053	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	541	42.97	45.61	455.14	Redev	Res Potential	
95	2465	CAMPUS DR	24,400	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	541	31.72	33.67	335.99	Redev	Res Potential	
96	2495	CAMPUS DR	17,318	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	541	22.51	23.90	238.47	Redev	Res Potential	
97	2601	CAMPUS DR	-51,790	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	543	-67.33	-71.47	-713.15	Fixed		
97	2525	CAMPUS DR	-30,200	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	543	-39.26	-41.68	-415.85	Fixed		
97	2525	CAMPUS DR	-17,669	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	543	-22.97	-24.38	-243.30	Fixed		
97	2525	CAMPUS DR	17,669	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	543	22.97	24.38	243.30	Fixed		
97	2525	CAMPUS DR	30,200	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	543	39.26	41.68	415.85	Fixed		in 2015
97	2601	CAMPUS DR	51,790	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	543	67.33	71.47	713.15	Fixed		in 2015
97	2601	CAMPUS DR	-1,122	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	543	-0.50	-0.47	-5.18	Fixed		
97	2601	CAMPUS DR	1,122	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	543	0.50	0.47	5.18	Fixed		in 2015
98	2727	CAMPUS DR	404	DU	Pending Approval	102	Condominiums	PA36	5.1	IBC Multi-Use	545	202.00	210.08	2,545.20	Redev	Res Potential	in 2015
98	2747	CAMPUS DR	-16,325	SF	RA Future Demo	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	545	-41.47	-113.62	-1,371.30	Redev	Res Potential	
98	2747	CAMPUS DR	16,325	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	545	41.47	113.62	1,371.30	Redev	Res Potential	
98	2727	CAMPUS DR	22,100	SF	Pending Approval	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	545	56.13	153.82	1,856.40	Redev	Res Potential	
98	2649	CAMPUS DR	-33,859	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	545	-44.02	-46.73	-466.24	Redev	Res Potential	
98	2727	CAMPUS DR	-20,000	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	545	-26.00	-27.60	-275.40	Redev	Res Potential	
98	18910	TELLER AVE	-14,285	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	545	-18.57	-19.71	-196.70	Redev	Res Potential	
98	2737	CAMPUS DR	-14,000	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	545	-18.20	-19.32	-192.78	Redev	Res Potential	
98	2649	CAMPUS DR	-13,682	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	545	-17.79	-18.88	-188.40	Redev	Res Potential	
98	18900	TELLER AVE	-11,674	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	545	-15.18	-16.11	-160.75	Redev	Res Potential	
98	2747	CAMPUS DR	-1,260	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	545	-1.64	-1.74	-17.35	Redev	Res Potential	
98	2737	CAMPUS DR	-700	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	545	-0.91	-0.97	-9.64	Redev	Res Potential	
98	18910	TELLER AVE	0	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	545	0.00	0.00	0.00	Redev	Res Potential	

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
98	18910	TELLER AVE	0	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	545	0.00	0.00	0.00	Redev	Res Potential	
98	2737	CAMPUS DR	700	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	545	0.91	0.97	9.64	Redev	Res Potential	
98	2747	CAMPUS DR	1,260	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	545	1.64	1.74	17.35	Redev	Res Potential	
98	18900	TELLER AVE	11,674	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	545	15.18	16.11	160.75	Redev	Res Potential	
98	2649	CAMPUS DR	13,682	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	545	17.79	18.88	188.40	Redev	Res Potential	
98	2737	CAMPUS DR	14,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	545	18.20	19.32	192.78	Redev	Res Potential	
98	18910	TELLER AVE	14,285	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	545	18.57	19.71	196.70	Redev	Res Potential	
98	2727	CAMPUS DR	20,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	545	26.00	27.60	275.40	Redev	Res Potential	
98	2649	CAMPUS DR	33,859	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	545	44.02	46.73	466.24	Redev	Res Potential	
98	2727	CAMPUS DR	44,000	SF	Pending Approval	121	Office	PA36	5.1	IBC Multi-Use	545	57.20	60.72	605.88	Redev	Res Potential	
98	2727	CAMPUS DR	-9,200	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	545	-4.14	-3.86	-42.50	Redev	Res Potential	
98	18910	TELLER AVE	-5,804	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	545	-2.61	-2.44	-26.81	Redev	Res Potential	
98	2649	CAMPUS DR	-5,578	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	545	-2.51	-2.34	-25.77	Redev	Res Potential	
98	2747	CAMPUS DR	-1,615	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	545	-0.73	-0.68	-7.46	Redev	Res Potential	
98	2747	CAMPUS DR	1,615	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	545	0.73	0.68	7.46	Redev	Res Potential	
98	2649	CAMPUS DR	5,578	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	545	2.51	2.34	25.77	Redev	Res Potential	
98	18910	TELLER AVE	5,804	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	545	2.61	2.44	26.81	Redev	Res Potential	
98	2727	CAMPUS DR	9,200	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	545	4.14	3.86	42.50	Redev	Res Potential	
99	17770	CARTWRIGHT RD	103,700	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	482	134.81	143.11	1,427.95	Redev	Non-Res Optimization	
99	17770	CARTWRIGHT RD	45,600	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	482	20.52	19.15	210.67	Redev	Non-Res Optimization	
100	17500	CARTWRIGHT RD	31,963	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	482	41.55	44.11	440.13	Redev	Non-Res Optimization	
101	17570	CARTWRIGHT RD	1,614	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	482	2.10	2.23	22.22	Redev	Non-Res Optimization	
101	17570	CARTWRIGHT RD	10,569	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	482	13.74	14.59	145.54	Redev	Non-Res Optimization	
101	17570	CARTWRIGHT RD	2,582	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	482	1.16	1.08	11.93	Redev	Non-Res Optimization	
102	17575	CARTWRIGHT RD	2,895	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	482	3.76	4.00	39.86	Redev	Non-Res Optimization	
102	17575	CARTWRIGHT RD	9,464	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	482	12.30	13.06	130.32	Redev	Non-Res Optimization	
102	17575	CARTWRIGHT RD	2,116	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	482	0.95	0.89	9.78	Redev	Non-Res Optimization	
103	17595	CARTWRIGHT RD	18,489	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	482	24.04	25.51	254.59	Redev	Non-Res Optimization	
103	17595	CARTWRIGHT RD	5,511	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	482	2.48	2.31	25.46	Redev	Non-Res Optimization	
104	17801	CARTWRIGHT RD	17,728	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	491	23.05	24.46	244.11	Redev	Res Potential	
104	2400	MAIN ST	18,144	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	491	23.59	25.04	249.84	Redev	Res Potential	
105	2350	MAIN ST	754	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	491	0.98	1.04	10.38	Redev	Res Potential	
105	2350	MAIN ST	84,046	SF	Existing	161	Mini Warehouse	PA36	5.1	IBC Multi-Use	491	24.37	22.69	255.50	Redev	Res Potential	
106	17861	CARTWRIGHT RD	21,294	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	491	27.68	29.39	293.22	Redev	Res Potential	
107	17872	CARTWRIGHT RD	5,183	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	495	6.74	7.15	71.37	Redev	Res Potential	
107	17872	CARTWRIGHT RD	22,710	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	495	29.52	31.34	312.72	Redev	Res Potential	
107	17872	CARTWRIGHT RD	51,208	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	495	23.04	21.51	236.58	Redev	Res Potential	
108	17881	CARTWRIGHT RD	8,248	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	491	10.72	11.38	113.57	Redev	Res Potential	
108	17881	CARTWRIGHT RD	14,941	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	491	19.42	20.62	205.74	Redev	Res Potential	
108	17891	CARTWRIGHT RD	20,654	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	491	26.85	28.50	284.41	Redev	Res Potential	
108	17891	CARTWRIGHT RD	6,894	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	491	3.10	2.90	31.85	Redev	Res Potential	
108	17881	CARTWRIGHT RD	7,884	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	491	3.55	3.31	36.42	Redev	Res Potential	
109	16102	CONSTRUCTION CIR E	1,400	SF	Discretionary Approval	121	Office	PA36	5.2	IBC Industrial	422	1.82	1.93	19.28	Fixed		
109	16102	CONSTRUCTION CIR E	9,369	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	12.18	12.93	129.01	Fixed		
109	16102	CONSTRUCTION CIR E	40,000	SF	Discretionary Approval	123	Manufacturing	PA36	5.2	IBC Industrial	422	18.00	16.80	184.80	Fixed		
110	16122	CONSTRUCTION CIR E	3,153	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	4.10	4.35	43.42	Fixed		
110	16122	CONSTRUCTION CIR E	3,699	SF	Existing	121	Office	PA36	5.2	IBC Industrial	422	4.81	5.10	50.94	Fixed		in 2015
110	16152	CONSTRUCTION CIR E	11,032	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	14.34	15.22	151.91	Fixed		
110	16122	CONSTRUCTION CIR E	11,318	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	422	5.09	4.75	52.29	Fixed		in 2015
111	16081	CONSTRUCTION N	16,154	SF	Discretionary Approval	121	Office	PA36	5.2	IBC Industrial	411	21.00	22.29	222.44	Fixed		
111	16081	CONSTRUCTION N	2,600	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	1.17	1.09	12.01	Fixed		in 2015
112	16091	CONSTRUCTION CIR W	800	SF	Existing	121	Office	PA36	5.2	IBC Industrial	411	1.04	1.10	11.02	Fixed		in 2015
112	16091	CONSTRUCTION CIR W	20,131	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	26.17	27.78	277.20	Fixed		
112	16091	CONSTRUCTION CIR W	26,200	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	11.79	11.00	121.04	Fixed		in 2015
113	16092	CONSTRUCTION CIR E	14,841	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	19.29	20.48	204.36	Fixed		
113	16092	CONSTRUCTION CIR E	3,120	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	422	1.40	1.31	14.41	Fixed		in 2015
114	16101	CONSTRUCTION CIR W	1,300	SF	Existing	121	Office	PA36	5.2	IBC Industrial	411	1.69	1.79	17.90	Fixed		in 2015
114	16101	CONSTRUCTION CIR W	6,741	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	8.76	9.30	92.82	Fixed		
114	16101	CONSTRUCTION CIR W	8,696	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	3.91	3.65	40.18	Fixed		in 2015
116	16122	CONSTRUCTION CIR W	16,667	SF	Discretionary Approval	123	Manufacturing	PA36	5.2	IBC Industrial	411	7.50	7.00	77.00	Fixed		
116	16122	CONSTRUCTION CIR W	76,667	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	34.50	32.20	354.20	Fixed		in 2015
116	16131	CONSTRUCTION CIR E	16,666	SF	Discretionary Approval	123	Manufacturing	PA36	5.2	IBC Industrial	422	7.50	7.00	77.00	Fixed		
116	16131	CONSTRUCTION CIR E	76,666	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	422	34.50	32.20	354.20	Fixed		in 2015
117	16131	CONSTRUCTION CIR W	2,100	SF	Existing	121	Office	PA36	5.2	IBC Industrial	411	2.73	2.90	28.92	Fixed		in 2015
117	16131	CONSTRUCTION CIR W	7,971	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	10.36	11.00	109.76	Fixed		
117	16131	CONSTRUCTION CIR W	2,625	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	1.18	1.10	12.13	Fixed		in 2015
118	16161	CONSTRUCTION CIR E	900	SF	Existing	121	Office	PA36	5.2	IBC Industrial	422	1.17	1.24	12.39	Fixed		in 2015
118	16161	CONSTRUCTION CIR E	22,499	SF	Discretionary Approval	121	Office	PA36	5.2	IBC Industrial	422	29.25	31.05	309.81	Fixed		
119	16161	CONSTRUCTION CIR W	5,510	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	7.16	7.60	75.87	Fixed		
119	16161	CONSTRUCTION CIR W	18,375	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	8.27	7.72	84.89	Fixed		in 2015
120	16182	CONSTRUCTION CIR W	3,000	SF	Existing	121	Office	PA36	5.2	IBC Industrial	411	3.90	4.14	41.31	Fixed		in 2015
120	16182	CONSTRUCTION CIR W	15,780	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	20.51	21.78	217.29	Fixed		
120	16182	CONSTRUCTION CIR W	3,000	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	1.35	1.26	13.86	Fixed		in 2015
121	16182	CONSTRUCTION CIR E	11,032	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	14.34	15.22	151.91	Fixed		
122	16191	CONSTRUCTION CIR W	5,000	SF	Existing	109	Commercial (EQ)	PA36	5.2	IBC Industrial	411	12.70	34.80	420.00	Fixed		in 2015
122	16191	CONSTRUCTION CIR W	1,800	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	2.34	2.48	24.79	Fixed		
122	16191	CONSTRUCTION CIR W	15,000	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	6.75	6.30	69.30	Fixed		in 2015
123	16212	CONSTRUCTION CIR E	2,120	SF	Existing	121	Office	PA36	5.2	IBC Industrial	422	2.76	2.93	29.19	Fixed		in 2015
123	16212	CONSTRUCTION CIR E	8,746	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	11.37	12.07	120.43	Fixed		
124	16221	CONSTRUCTION CIR E	11,064	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	14.38	15.27	152.35	Fixed		
125	16242	CONSTRUCTION CIR W	73,692	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	33.16	30.95	340.46	Fixed		in 2015
126	16251	CONSTRUCTION CIR W	2,500	SF	Existing	121	Office	PA36	5.2	IBC Industrial	411	3.25	3.45	34.43	Fixed		in 2015
126	16251	CONSTRUCTION CIR W	5,729	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	7.45	7.91	78.89	Fixed		

IBC Vision Plan Database Snap Shot As Of July 10, 2009

Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
126	16251	CONSTRUCTION CIR W	7,500	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	3.38	3.15	34.65	Fixed		in 2015
127	16252	CONSTRUCTION CIR E	1,815	SF	Existing	121	Office	PA36	5.2	IBC Industrial	422	2.36	2.50	24.99	Fixed		in 2015
127	16252	CONSTRUCTION CIR E	5,087	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	6.61	7.02	70.05	Fixed		
127	16252	CONSTRUCTION CIR E	17,805	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	422	8.01	7.48	82.26	Fixed		in 2015
128	16261	CONSTRUCTION CIR E	9,008	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	11.71	12.43	124.04	Fixed		
128	16261	CONSTRUCTION CIR E	7,980	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	422	3.59	3.35	36.87	Fixed		in 2015
129	16281	CONSTRUCTION CIR W	8,777	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	11.41	12.11	120.86	Fixed		
129	16281	CONSTRUCTION CIR W	5,700	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	2.57	2.39	26.33	Fixed		in 2015
130	16282	CONSTRUCTION CIR W	10,116	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	13.15	13.96	139.30	Fixed		
130	16282	CONSTRUCTION CIR W	3,720	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	1.67	1.56	17.19	Fixed		in 2015
131	16282	CONSTRUCTION CIR E	2,899	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	3.77	4.00	39.92	Fixed		
131	16282	CONSTRUCTION CIR E	3,170	SF	Existing	121	Office	PA36	5.2	IBC Industrial	422	4.12	4.37	43.65	Fixed		in 2015
131	16282	CONSTRUCTION CIR E	14,750	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	422	6.64	6.20	68.15	Fixed		in 2015
132	16291	CONSTRUCTION CIR E	8,358	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	10.87	11.53	115.09	Fixed		
132	16291	CONSTRUCTION CIR E	8,800	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	422	3.96	3.70	40.66	Fixed		in 2015
133	16312	CONSTRUCTION CIR E	11,032	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	14.34	15.22	151.91	Fixed		
134	16321	CONSTRUCTION CIR W	3,000	SF	Existing	121	Office	PA36	5.2	IBC Industrial	411	3.90	4.14	41.31	Fixed		in 2015
134	16321	CONSTRUCTION CIR W	15,273	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	19.85	21.08	210.31	Fixed		
134	16321	CONSTRUCTION CIR W	10,500	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	4.73	4.41	48.51	Fixed		in 2015
135	16330	CONSTRUCTION CIR W	10,258	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	13.34	14.16	141.25	Fixed		
135	16330	CONSTRUCTION CIR W	3,200	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	1.44	1.34	14.78	Fixed		in 2015
136	16331	CONSTRUCTION CIR E	8,781	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	11.42	12.12	120.91	Fixed		
136	16331	CONSTRUCTION CIR E	8,000	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	422	3.60	3.36	36.96	Fixed		in 2015
138	16371	CONSTRUCTION CIR W	25,125	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	32.66	34.67	345.97	Fixed		
138	16371	CONSTRUCTION CIR W	1,200	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	0.54	0.50	5.54	Fixed		in 2015
138	16342	CONSTRUCTION CIR E	11,032	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	14.34	15.22	151.91	Fixed		
139	16372	CONSTRUCTION CIR E	2,382	SF	Existing	121	Office	PA36	5.2	IBC Industrial	422	3.10	3.29	32.80	Fixed		in 2015
139	16372	CONSTRUCTION CIR E	4,636	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	6.03	6.40	63.84	Fixed		
139	16372	CONSTRUCTION CIR E	10,838	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	422	4.88	4.55	50.07	Fixed		in 2015
140	16381	CONSTRUCTION CIR W	10,890	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	14.16	15.03	149.96	Fixed		
141	16401	CONSTRUCTION CIR W	4,984	SF	Existing	121	Office	PA36	5.2	IBC Industrial	411	6.48	6.88	68.63	Fixed		in 2015
141	16401	CONSTRUCTION CIR W	6,911	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	8.98	9.54	95.16	Fixed		
141	16401	CONSTRUCTION CIR W	5,345	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	2.41	2.24	24.69	Fixed		in 2015
142	16402	CONSTRUCTION CIR E	3,127	SF	Existing	121	Office	PA36	5.2	IBC Industrial	422	4.07	4.32	43.06	Fixed		in 2015
142	16402	CONSTRUCTION CIR E	7,332	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	9.53	10.12	100.96	Fixed		
142	16402	CONSTRUCTION CIR E	3,200	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	422	1.44	1.34	14.78	Fixed		in 2015
143	16452	CONSTRUCTION S	8,000	SF	Existing	121	Office	PA36	5.2	IBC Industrial	422	10.40	11.04	110.16	Fixed		in 2015
143	16452	CONSTRUCTION S	15,974	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	422	20.77	22.04	219.96	Fixed		
143	16452	CONSTRUCTION S	33,901	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	422	15.26	14.24	156.62	Fixed		in 2015
144	0	CORPORATE PARK	3,017	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	443	3.92	4.16	41.54	Fixed		
145	2	CORPORATE PARK	44,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	454	57.85	61.41	612.77	Fixed		in 2015
146	1	CORPORATE PARK	24,288	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	453	31.57	33.52	334.45	Fixed		in 2015
146	3	CORPORATE PARK	38,256	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	453	49.73	52.79	526.79	Fixed		in 2015
147	5	CORPORATE PARK	42,832	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	453	55.68	59.11	589.80	Fixed		in 2015
148	7	CORPORATE PARK	38,256	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	453	49.73	52.79	526.79	Fixed		in 2015
149	8	CORPORATE PARK	46,715	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	454	60.73	64.47	643.27	Fixed		in 2015
150	9	CORPORATE PARK	24,288	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	453	31.57	33.52	334.45	Fixed		in 2015
151	10	CORPORATE PARK	38,185	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	454	49.64	52.70	525.81	Fixed		in 2015
152	15	CORPORATE PARK	15,242	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	453	19.81	21.03	209.88	Fixed		in 2015
153	26	CORPORATE PARK	15,417	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	464	20.04	21.28	212.29	Fixed		in 2015
153	20	CORPORATE PARK	56,209	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	464	73.07	77.57	774.00	Fixed		in 2015
154	19	CORPORATE PARK	670	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	453	0.87	0.92	9.23	Fixed		
154	19	CORPORATE PARK	26,250	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	453	34.13	36.23	361.46	Fixed		in 2015
154	19	CORPORATE PARK	2,024	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	453	0.91	0.85	9.35	Fixed		in 2015
155	22	CORPORATE PARK	17,194	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	464	22.35	23.73	236.76	Fixed		in 2015
155	22	CORPORATE PARK	1,894	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	464	0.85	0.80	8.75	Fixed		in 2015
156	30	CORPORATE PARK	91,255	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	469	118.63	125.93	1,256.58	Fixed		in 2015
157	38	CORPORATE PARK	22,170	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	469	28.82	30.59	305.28	Fixed		in 2015
158	41	CORPORATE PARK	28,668	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	453	37.27	39.56	394.76	Fixed		in 2015
159	42	CORPORATE PARK	19,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	469	25.35	26.91	268.52	Fixed		in 2015
160	43	CORPORATE PARK	29,187	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	453	37.94	40.28	401.90	Fixed		in 2015
161	46	CORPORATE PARK	17,290	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	451	22.48	23.86	238.08	Fixed		in 2015
161	46	CORPORATE PARK	2,748	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	451	1.24	1.15	12.70	Fixed		in 2015
162	50	CORPORATE PARK	13,997	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	451	18.20	19.32	192.74	Fixed		in 2015
163	54	CORPORATE PARK	14,383	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	451	18.70	19.85	198.05	Fixed		in 2015
164	60	CORPORATE PARK	15,977	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	451	20.77	22.05	220.00	Fixed		in 2015
165	62	CORPORATE PARK	30,913	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	451	40.19	42.66	425.67	Fixed		in 2015
166	72	CORPORATE PARK	26,181	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	443	34.04	36.13	360.51	Fixed		in 2015
166	72	CORPORATE PARK	6,094	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	443	2.74	2.56	28.15	Fixed		in 2015
167	76	CORPORATE PARK	2,299	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	443	5.84	16.00	193.12	Fixed		in 2015
168	80	CORPORATE PARK	1,310	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	443	3.33	9.12	110.04	Fixed		in 2015
169	84	CORPORATE PARK	3,418	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	443	8.68	23.79	287.11	Fixed		in 2015
170	88	CORPORATE PARK	2,453	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	443	6.23	17.07	206.05	Fixed		in 2015
171	92	CORPORATE PARK	11,082	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	443	28.15	77.13	930.89	Fixed		in 2015
172	96	CORPORATE PARK	37,587	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	443	48.86	51.87	517.57	Fixed		in 2015
173	17661	COWAN	2,385	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	426	3.10	3.29	32.84	Fixed		
173	17661	COWAN	21,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	27.30	28.98	289.17	Fixed		in 2015
173	17671	COWAN	36,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	46.80	49.68	495.72	Fixed		in 2015
173	17661	COWAN	4,000	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	426	1.80	1.68	18.48	Fixed		in 2015
174	17672	COWAN	689	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	426	0.90	0.95	9.49	Fixed		
174	17672	COWAN	23,436	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	30.47	32.34	322.71	Fixed		in 2015
174	17672	COWAN	27,875	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	426	12.54	11.71	128.78	Fixed		in 2015
175	17682	COWAN	6,660	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	8.66	9.19	91.71	Fixed		in 2015

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
175	17682	COWAN	2,247	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	426	1.01	0.94	10.38	Fixed		in 2015
176	17692	COWAN	328	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	426	0.43	0.45	4.52	Fixed		
176	17692	COWAN	3,700	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	4.81	5.11	50.95	Fixed		in 2015
176	17692	COWAN	12,556	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	426	5.65	5.27	58.01	Fixed		in 2015
177	17701 Unit 160	COWAN	863	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	426	1.12	1.19	11.88	Fixed		
177	17701 Unit 150	COWAN	4,164	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	5.41	5.75	57.34	Fixed		in 2015
177	17701 Unit 120	COWAN	4,692	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	6.10	6.47	64.61	Fixed		in 2015
177	17701 Unit 140	COWAN	4,788	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	6.22	6.61	65.93	Fixed		in 2015
177	17701 Unit 220	COWAN	4,820	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	6.27	6.65	66.37	Fixed		in 2015
177	17701 Unit 240	COWAN	4,879	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	6.34	6.73	67.18	Fixed		in 2015
177	17701 Unit 110	COWAN	5,082	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	6.61	7.01	69.98	Fixed		in 2015
177	17701 Unit 130	COWAN	5,255	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	6.83	7.25	72.36	Fixed		in 2015
177	17701 Unit 160	COWAN	5,282	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	6.87	7.29	72.73	Fixed		in 2015
177	17701 Unit 210	COWAN	5,376	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	6.99	7.42	74.03	Fixed		in 2015
177	17701 Unit 230	COWAN	5,392	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	7.01	7.44	74.25	Fixed		in 2015
177	17701 Unit 100	COWAN	9,735	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	12.66	13.43	134.05	Fixed		in 2015
177	17701 Unit 250	COWAN	10,026	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	13.03	13.84	138.06	Fixed		in 2015
177	17701 Unit 200	COWAN	10,077	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	13.10	13.91	138.76	Fixed		in 2015
178	17702	COWAN	14,925	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	19.40	20.60	205.52	Fixed		in 2015
179	17731	COWAN	980	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	414	2.49	6.82	82.32	Fixed		in 2015
179	17731	COWAN	4,325	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	414	5.62	5.97	59.56	Fixed		
179	17731	COWAN	20,592	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	26.77	28.42	283.55	Fixed		in 2015
179	17731	COWAN	36,408	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	414	16.38	15.29	168.20	Fixed		in 2015
180	17732	COWAN	14,469	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	18.81	19.97	199.24	Fixed		in 2015
181	17742	COWAN	13,459	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	17.50	18.57	185.33	Fixed		in 2015
182	17751	COWAN	6,688	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	414	8.69	9.23	92.09	Fixed		
182	17751	COWAN	7,873	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	10.23	10.86	108.41	Fixed		in 2015
182	17751	COWAN	33,127	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	414	14.91	13.91	153.05	Fixed		in 2015
183	17752	COWAN	10,131	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	13.17	13.98	139.50	Fixed		in 2015
183	17752	COWAN	6,050	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	414	2.72	2.54	27.95	Fixed		in 2015
184	17762	COWAN	13,600	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	17.68	18.77	187.27	Fixed		in 2015
185	17771	COWAN	56,242	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	73.11	77.61	774.45	Fixed		in 2015
185	17771	COWAN	3,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	414	1.35	1.26	13.86	Fixed		in 2015
186	17772	COWAN	485	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	414	0.63	0.67	6.68	Fixed		
186	17772	COWAN	6,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	8.45	8.97	89.51	Fixed		in 2015
186	17772	COWAN	2,045	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	414	0.92	0.86	9.45	Fixed		in 2015
187	17782	COWAN	3,350	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	414	8.51	23.32	281.40	Fixed		in 2015
187	17782	COWAN	16,953	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	22.04	23.40	233.44	Fixed		in 2015
187	17782	COWAN	14,293	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	414	6.43	6.00	66.03	Fixed		in 2015
188	17792	COWAN	140,100	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	414	63.05	58.84	647.26	Fixed		in 2015
189	17842	COWAN	20,664	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	26.86	28.52	284.54	Fixed		in 2015
189	17842	COWAN	26,586	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	11.96	11.17	122.83	Fixed		in 2015
190	17872	COWAN	7,569	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	430	9.84	10.45	104.23	Fixed		
190	17872	COWAN	9,626	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	12.51	13.28	132.55	Fixed		in 2015
190	17872	COWAN	14,176	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	6.38	5.95	65.49	Fixed		in 2015
191	17912	COWAN	3,200	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	4.16	4.42	44.06	Fixed		in 2015
191	17912	COWAN	3,623	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	430	4.71	5.00	49.89	Fixed		
191	17912	COWAN	20,259	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	9.12	8.51	93.60	Fixed		in 2015
192	17942	COWAN	21,733	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	28.25	29.99	299.26	Fixed		in 2015
193	17951	COWAN	25,038	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	32.55	34.55	344.77	Fixed		in 2015
193	17951	COWAN	1,392	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	0.63	0.58	6.43	Fixed		in 2015
194	17952	COWAN	1,369	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	430	1.78	1.89	18.85	Fixed		
194	17952	COWAN	2,189	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	2.85	3.02	30.14	Fixed		in 2015
194	17952	COWAN	14,280	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	6.43	6.00	65.97	Fixed		in 2015
195	17961	COWAN	255	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	430	0.33	0.35	3.51	Fixed		
195	17961	COWAN	6,040	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	7.85	8.34	83.17	Fixed		in 2015
195	17961	COWAN	5,995	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	2.70	2.52	27.70	Fixed		in 2015
196	17962	COWAN	15,930	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	20.71	21.98	219.36	Fixed		in 2015
197	17991	COWAN	18,900	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	24.57	26.08	260.25	Fixed		in 2015
198	17992	COWAN	10,228	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	13.30	14.11	140.84	Fixed		in 2015
198	17992	COWAN	1,910	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	0.86	0.80	8.82	Fixed		in 2015
199	18001	COWAN	32,510	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	42.26	44.86	447.66	Fixed		in 2015
199	18001	COWAN	5,378	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	2.42	2.26	24.85	Fixed		in 2015
200	18002	COWAN	15,384	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	20.00	21.23	211.84	Fixed		in 2015
200	18002	COWAN	2,572	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	1.16	1.08	11.88	Fixed		in 2015
201	18012	COWAN	24,988	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	32.48	34.48	344.08	Fixed		in 2015
202	18021	COWAN	28,989	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	37.69	40.00	399.18	Fixed		in 2015
203	18022	COWAN	57,100	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	74.23	78.80	786.27	Fixed		in 2015
204	2485	DA VINCI	592	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	482	0.77	0.82	8.15	Redev	Non-Res Optimization	
204	2485	DA VINCI	12,948	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	482	16.83	17.87	178.29	Redev	Non-Res Optimization	
204	2485	DA VINCI	4,360	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	482	1.96	1.83	20.14	Redev	Non-Res Optimization	
205	2495	DA VINCI	13,768	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	482	17.90	19.00	189.59	Redev	Non-Res Optimization	
206	2505	DA VINCI	3,192	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	482	4.15	4.40	43.95	Redev	Non-Res Optimization	
206	2505	DA VINCI	6,700	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	482	8.71	9.25	92.26	Redev	Non-Res Optimization	
206	2505	DA VINCI	9,200	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	482	4.14	3.86	42.50	Redev	Non-Res Optimization	
207	17031	DAIMLER ST	22,350	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	396	29.06	30.84	307.76	Fixed		in 2015
209	17072	DAIMLER ST	7,777	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	396	10.11	10.73	107.09	Fixed		
209	17072	DAIMLER ST	10,314	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	396	13.41	14.23	142.02	Fixed		in 2015
209	17072	DAIMLER ST	75,951	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	396	34.18	31.90	350.89	Fixed		in 2015
210	17091	DAIMLER ST	5,090	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	396	6.62	7.02	70.09	Fixed		in 2015
210	17091	DAIMLER ST	5,450	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	396	7.09	7.52	75.05	Fixed		
210	17091	DAIMLER ST	18,910	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	396	8.51	7.94	87.36	Fixed		in 2015
211	17131	DAIMLER ST	14,880	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	396	19.34	20.53	204.90	Fixed		in 2015

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
211	17131	DAIMLER ST	10,524	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	396	4.74	4.42	48.62	Fixed		in 2015
212	17192	DAIMLER ST	3,586	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	396	4.66	4.95	49.38	Fixed		in 2015
212	17152	DAIMLER ST	4,293	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	396	5.58	5.92	59.11	Fixed		in 2015
212	17192	DAIMLER ST	4,888	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	396	6.35	6.75	67.31	Fixed		
212	17152	DAIMLER ST	8,467	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	396	11.01	11.68	116.59	Fixed		
212	17152	DAIMLER ST	30,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	396	13.50	12.60	138.60	Fixed		in 2015
212	17192	DAIMLER ST	34,814	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	396	15.67	14.62	160.84	Fixed		in 2015
213	17201	DAIMLER ST	1,601	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	396	2.08	2.21	22.05	Fixed		
213	17201	DAIMLER ST	19,701	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	396	25.61	27.19	271.28	Fixed		in 2015
213	17201	DAIMLER ST	36,438	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	396	16.40	15.30	168.34	Fixed		in 2015
214	17221	DAIMLER ST	8,031	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	396	10.44	11.08	110.59	Fixed		
214	17221	DAIMLER ST	26,097	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	396	11.74	10.96	120.57	Fixed		in 2015
215	17302	DAIMLER ST	6,114	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	400	7.95	8.44	84.19	Fixed		in 2015
215	17302	DAIMLER ST	7,754	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	400	10.08	10.70	106.77	Fixed		
215	17302	DAIMLER ST	29,321	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	400	13.19	12.31	135.46	Fixed		in 2015
216	17305	DAIMLER ST	2,853	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	400	3.71	3.94	39.29	Fixed		
216	17305	DAIMLER ST	8,910	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	400	11.58	12.30	122.69	Fixed		in 2015
216	17305	DAIMLER ST	47,630	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	400	21.43	20.00	220.05	Fixed		in 2015
217	17335	DAIMLER ST	3,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	400	3.90	4.14	41.31	Fixed		in 2015
217	17335	DAIMLER ST	3,439	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	400	4.47	4.75	47.36	Fixed		
217	17335	DAIMLER ST	19,369	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	400	8.72	8.13	89.48	Fixed		in 2015
218	17352	DAIMLER ST	4,428	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	400	5.76	6.11	60.97	Fixed		in 2015
218	17352	DAIMLER ST	5,707	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	400	7.42	7.88	78.59	Fixed		
218	17352	DAIMLER ST	25,960	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	400	11.68	10.90	119.94	Fixed		in 2015
219	17365	DAIMLER ST	6,224	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	400	8.09	8.59	85.70	Fixed		in 2015
219	17365	DAIMLER ST	15,989	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	400	7.20	6.72	73.87	Fixed		in 2015
220	17392	DAIMLER ST	3,603	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	400	4.68	4.97	49.61	Fixed		in 2015
220	17392	DAIMLER ST	6,812	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	400	8.86	9.40	93.80	Fixed		
220	17392	DAIMLER ST	39,593	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	400	17.82	16.63	182.92	Fixed		in 2015
221	17395	DAIMLER ST	4,792	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	400	6.23	6.61	65.99	Fixed		
221	17395	DAIMLER ST	23,368	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	400	10.52	9.81	107.96	Fixed		in 2015
222	17421	DAIMLER ST	2,768	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	400	3.60	3.82	38.12	Fixed		
222	17421	DAIMLER ST	3,560	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	400	4.63	4.91	49.02	Fixed		in 2015
222	17421	DAIMLER ST	19,821	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	400	8.92	8.32	91.57	Fixed		in 2015
223	17426	DAIMLER ST	13,600	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	400	17.68	18.77	187.27	Fixed		in 2015
223	17426	DAIMLER ST	22,210	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	400	9.99	9.33	102.61	Fixed		in 2015
224	17466	DAIMLER ST	3,804	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	400	4.95	5.25	52.38	Fixed		
224	17466	DAIMLER ST	5,890	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	400	7.66	8.13	81.11	Fixed		in 2015
224	17466	DAIMLER ST	34,811	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	400	15.66	14.62	160.83	Fixed		in 2015
225	17502	DAIMLER ST	4,388	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	400	5.70	6.06	60.42	Fixed		in 2015
225	17502	DAIMLER ST	8,300	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	400	10.79	11.45	114.29	Fixed		
225	17502	DAIMLER ST	21,138	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	400	9.51	8.88	97.66	Fixed		in 2015
226	1582	DEERE AVE	2,284	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	398	2.97	3.15	31.45	Fixed		in 2015
226	1582	DEERE AVE	3,202	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	398	4.16	4.42	44.09	Fixed		
226	1582	DEERE AVE	12,425	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	398	5.59	5.22	57.40	Fixed		in 2015
227	16700	RED HILL AVE	30,603	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	395	39.78	42.23	421.40	Fixed		in 2015
227	16700	RED HILL AVE	71,869	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	395	93.43	99.18	989.64	Fixed		
227	16700	RED HILL AVE	151,406	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	395	68.13	63.59	699.50	Fixed		in 2015
228	1622	DEERE AVE	1,239	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	398	1.61	1.71	17.06	Fixed		
228	1622	DEERE AVE	3,718	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	398	4.83	5.13	51.20	Fixed		in 2015
228	1622	DEERE AVE	12,281	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	398	5.53	5.16	56.74	Fixed		in 2015
229	1652	DEERE AVE	975	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	398	1.27	1.35	13.43	Fixed		in 2015
229	1652	DEERE AVE	2,880	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	398	3.74	3.97	39.66	Fixed		
229	1652	DEERE AVE	15,024	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	398	6.76	6.31	69.41	Fixed		in 2015
230	1692	DEERE AVE	400	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	398	0.52	0.55	5.51	Fixed		
230	1692	DEERE AVE	6,385	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	398	8.30	8.81	87.92	Fixed		in 2015
230	1692	DEERE AVE	8,084	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	398	3.64	3.40	37.35	Fixed		in 2015
231	1822	DEERE AVE	6,422	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	405	8.35	8.86	88.43	Fixed		in 2015
231	1822	DEERE AVE	21,232	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	405	27.60	29.30	292.36	Fixed		
231	1822	DEERE AVE	70,334	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	405	31.65	29.54	324.94	Fixed		in 2015
232	1902	DEERE AVE	27,012	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	405	35.12	37.28	371.96	Fixed		
232	1902	DEERE AVE	119,958	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	405	53.98	50.38	554.21	Fixed		in 2015
233	1931	DEERE AVE	9,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	401	12.35	13.11	130.82	Fixed		in 2015
233	1931	DEERE AVE	36,154	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	401	47.00	49.89	497.84	Fixed		
233	1931	DEERE AVE	64,080	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	401	28.84	26.91	296.05	Fixed		in 2015
234	1939	DEERE AVE	4,348	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	401	5.65	6.00	59.87	Fixed		
234	1939	DEERE AVE	21,963	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	401	28.55	30.31	302.43	Fixed		in 2015
234	1939	DEERE AVE	30,801	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	401	13.86	12.94	142.30	Fixed		in 2015
235	17275	DERIAN AVE	899	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	472	1.17	1.24	12.38	Redev	Non-Res Optimization	
235	17275	DERIAN AVE	18,192	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	472	23.65	25.10	250.50	Redev	Non-Res Optimization	
235	17275	DERIAN AVE	13,480	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	472	6.07	5.66	62.28	Redev	Non-Res Optimization	
236	17352	DERIAN AVE	4,400	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	481	5.72	6.07	60.59	Fixed		in 2015
236	17352	DERIAN AVE	13,061	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	481	16.98	18.02	179.85	Fixed		
236	17352	DERIAN AVE	129,551	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	481	58.30	54.41	598.53	Fixed		in 2015
237	17353	DERIAN AVE	5,815	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	477	7.56	8.02	80.07	Fixed		
237	17353	DERIAN AVE	12,240	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	477	15.91	16.89	168.54	Fixed		in 2015
237	17353	DERIAN AVE	53,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	477	23.85	22.26	244.86	Fixed		in 2015
238	17420	DERIAN AVE	12,691	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	481	16.50	17.51	174.76	Fixed		in 2015
238	17420	DERIAN AVE	16,477	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	481	21.42	22.74	226.89	Fixed		
238	17420	DERIAN AVE	71,375	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	481	32.12	29.98	329.75	Fixed		in 2015
239	17421	DERIAN AVE	9,420	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	477	12.25	13.00	129.71	Redev	Non-Res Optimization	
239	17421	DERIAN AVE	10,839	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	477	14.09	14.96	149.25	Redev	Non-Res Optimization	
239	17421	DERIAN AVE	79,093	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	477	35.59	33.22	365.41	Redev	Non-Res Optimization	

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
240	17461	DERIAN AVE	296	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	477	0.38	0.41	4.08	Fixed		
240	17461	DERIAN AVE	106,022	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	477	137.83	146.31	1,459.92	Fixed		in 2015
241	2493	DU BRIDGE AVE	7,200	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	438	9.36	9.94	99.14	Redev	Res Potential	
241	2493	DU BRIDGE AVE	14,350	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	6.46	6.03	66.30	Redev	Res Potential	
242	2641	DU BRIDGE AVE	5,680	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	446	7.38	7.84	78.21	Redev	Potential 2-acre park Site, otherwise residential	
242	2641	DU BRIDGE AVE	15,029	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	6.76	6.31	69.43	Redev	Potential 2-acre park Site, otherwise residential	
243	2152	DUPONT DR	10,674	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	512	13.88	14.73	146.98	Fixed		
243	2152	DUPONT DR	14,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	512	18.85	20.01	199.67	Fixed		in 2015
244	2172	DUPONT DR	645	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	512	0.84	0.89	8.88	Fixed		
244	2172	DUPONT DR	15,297	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	512	19.89	21.11	210.64	Fixed		in 2015
245	2181	DUPONT DR	7,354	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	517	9.56	10.15	101.26	Fixed		in 2015
245	2181	DUPONT DR	30,000	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	517	39.00	41.40	413.10	Fixed		
245	2181	DUPONT DR	81,647	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	517	36.74	34.29	377.21	Fixed		in 2015
246	2182	DUPONT DR	12,642	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	512	16.43	17.45	174.08	Fixed		in 2015
247	2192	DUPONT DR	15,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	512	19.50	20.70	206.55	Fixed		in 2015
248	2201	DUPONT DR	252,017	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	521	327.62	347.78	3,470.27	Fixed		in 2015
249	2212	DUPONT DR	17,290	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	512	22.48	23.86	238.08	Fixed		in 2015
250	2442	DUPONT DR	5,993	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	536	7.79	8.27	82.52	Fixed		
250	2442	DUPONT DR	38,105	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	536	49.54	52.58	524.71	Fixed		in 2015
250	2442	DUPONT DR	22,824	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	536	10.27	9.59	105.45	Fixed		in 2015
251	2525	DUPONT DR	-101,960	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	525	-132.55	-140.70	-1,403.99	Fixed		
251	18600	VON KARMAN AVE	10,828	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	525	14.08	14.94	149.10	Fixed		in 2015
251	18655	TELLER AVE	14,300	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	525	18.59	19.73	196.91	Fixed		
251	18700	VON KARMAN AVE	23,084	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	525	30.01	31.86	317.87	Fixed		in 2015
251	2525	DUPONT DR	101,960	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	525	132.55	140.70	1,403.99	Fixed		
251	18650	VON KARMAN AVE	120,840	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	525	157.09	166.76	1,663.97	Fixed		in 2015
251	2525	DUPONT DR	298,076	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	525	387.50	411.34	4,104.51	Fixed		in 2015
251	18650	VON KARMAN AVE	53,160	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	525	23.92	22.33	245.60	Fixed		in 2015
251	18600	VON KARMAN AVE	70,622	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	525	31.78	29.66	326.27	Fixed		in 2015
251	2525	DUPONT DR	78,471	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	525	35.31	32.96	362.54	Fixed		in 2015
251	2525	DUPONT DR	-54,902	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	529	-71.37	-75.76	-756.00	Fixed		
251	18655	TELLER AVE	7,700	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	529	10.01	10.63	106.03	Fixed		
251	2525	DUPONT DR	23,288	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	529	30.27	32.14	320.68	Fixed		
251	2525	DUPONT DR	54,902	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	529	71.37	75.76	756.00	Fixed		
251	18655	TELLER AVE	68,771	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	529	89.40	94.90	946.98	Fixed		in 2015
251	18655	TELLER AVE	108,037	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	529	48.62	45.38	499.13	Fixed		in 2015
252	2532	DUPONT DR	24,882	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	539	32.35	34.34	342.63	Fixed		in 2015
253	2592	DUPONT DR	11,314	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	539	14.71	15.61	155.79	Fixed		in 2015
253	2592	DUPONT DR	23,846	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	539	31.00	32.91	328.36	Fixed		
253	2592	DUPONT DR	20,366	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	539	9.16	8.55	94.09	Fixed		in 2015
254	2636	DUPONT DR	10,661	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	542	27.08	74.20	895.52	Fixed		in 2015
254	2646	DUPONT DR	11,316	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	542	28.74	78.76	950.54	Fixed		in 2015
254	2626	DUPONT DR	13,658	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	542	34.69	95.06	1,147.27	Fixed		in 2015
254	2646	DUPONT DR	12,308	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	542	16.00	16.99	169.48	Fixed		
254	2646	DUPONT DR	24,824	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	542	32.27	34.26	341.83	Fixed		in 2015
254	2636	DUPONT DR	779	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	542	0.35	0.33	3.60	Fixed		in 2015
255	1021	DURYEA AVE	10,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	396	13.00	13.80	137.70	Fixed		in 2015
255	1021	DURYEA AVE	11,275	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	396	5.07	4.74	52.09	Fixed		in 2015
256	1061	DURYEA AVE	9,507	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	396	12.36	13.12	130.91	Fixed		
257	1091	DURYEA AVE	3,057	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	396	3.97	4.22	42.09	Fixed		
257	1091	DURYEA AVE	3,547	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	396	4.61	4.89	48.84	Fixed		in 2015
257	1091	DURYEA AVE	10,089	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	396	4.54	4.24	46.61	Fixed		in 2015
258	1121	DURYEA AVE	2,205	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	396	2.87	3.04	30.36	Fixed		in 2015
258	1121	DURYEA AVE	4,617	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	396	6.00	6.37	63.58	Fixed		
258	1121	DURYEA AVE	17,975	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	396	8.09	7.55	83.04	Fixed		in 2015
259	17312	EASTMAN AVE	2,556	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	413	3.32	3.53	35.20	Fixed		in 2015
259	17312	EASTMAN AVE	13,444	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	413	6.05	5.65	62.11	Fixed		in 2015
260	17321	EASTMAN AVE	2,533	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	408	3.29	3.50	34.88	Fixed		
260	17321	EASTMAN AVE	11,625	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	408	15.11	16.04	160.08	Fixed		in 2015
260	17321	EASTMAN AVE	19,571	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	408	8.81	8.22	90.42	Fixed		in 2015
261	17342	EASTMAN AVE	2,400	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	413	3.12	3.31	33.05	Fixed		in 2015
261	17342	EASTMAN AVE	4,926	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	413	6.40	6.80	67.83	Fixed		
261	17342	EASTMAN AVE	12,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	413	5.40	5.04	55.44	Fixed		in 2015
262	17361	EASTMAN AVE	17,391	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	408	22.61	24.00	239.47	Fixed		
263	17372	EASTMAN AVE	2,900	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	413	3.77	4.00	39.93	Fixed		in 2015
263	17372	EASTMAN AVE	3,128	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	413	4.07	4.32	43.07	Fixed		
263	17372	EASTMAN AVE	15,800	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	413	7.11	6.64	73.00	Fixed		in 2015
264	17401	EASTMAN AVE	1,420	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	408	1.85	1.96	19.55	Fixed		
264	17401	EASTMAN AVE	11,004	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	408	14.31	15.19	151.53	Fixed		in 2015
264	17401	EASTMAN AVE	33,005	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	408	14.85	13.86	152.48	Fixed		in 2015
265	0	EDISON	0	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	532	0.00	0.00	0.00	Fixed		
265	0	EDISON	0	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	532	0.00	0.00	0.00	Fixed		in 2015
266	8	EXECUTIVE	39,147	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	467	50.89	54.02	539.05	Fixed		in 2015
266	2	EXECUTIVE	42,854	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	467	55.71	59.14	590.10	Fixed		in 2015
266	4	EXECUTIVE	42,854	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	467	55.71	59.14	590.10	Fixed		in 2015
266	6	EXECUTIVE	42,854	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	467	55.71	59.14	590.10	Fixed		in 2015
266	9	EXECUTIVE	44,861	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	467	58.32	61.91	617.74	Fixed		in 2015
267	1780	MAIN ST	4,831	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	480	12.27	33.62	405.80	Fixed		in 2015
267	1818	MAIN ST	5,971	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	480	15.17	41.56	501.56	Fixed		in 2015
267	1830	MAIN ST	9,800	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	480	24.89	68.21	823.20	Fixed		in 2015
267	28	EXECUTIVE	39,147	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	480	50.89	54.02	539.05	Fixed		in 2015
267	24	EXECUTIVE	41,675	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	480	54.18	57.51	573.86	Fixed		in 2015
267	26	EXECUTIVE	41,675	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	480	54.18	57.51	573.86	Fixed		in 2015

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
267	20	EXECUTIVE	42,854	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	480	55.71	59.14	590.10	Fixed		in 2015
267	22	EXECUTIVE	42,854	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	480	55.71	59.14	590.10	Fixed		in 2015
268	38	EXECUTIVE	15,276	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	480	19.86	21.08	210.35	Fixed		in 2015
268	30	EXECUTIVE	42,854	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	480	55.71	59.14	590.10	Fixed		in 2015
268	32	EXECUTIVE	42,854	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	480	55.71	59.14	590.10	Fixed		in 2015
268	34	EXECUTIVE	42,854	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	480	55.71	59.14	590.10	Fixed		in 2015
268	36	EXECUTIVE	42,854	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	480	55.71	59.14	590.10	Fixed		in 2015
269	19600	FAIRCHILD	58,245	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	546	75.72	80.38	802.03	Fixed		in 2015
270	19700	FAIRCHILD	58,245	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	546	75.72	80.38	802.03	Fixed		in 2015
271	17601	FITCH	20,880	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	414	27.14	28.81	287.52	Fixed		
271	17601	FITCH	132	ROOM	Permits Issued	162	Hotel-Extended Stay	PA36	5.1	IBC Multi-Use	414	50.16	55.44	678.48	Fixed		in 2015
272	17620	FITCH	35,418	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	46.04	48.88	487.71	Fixed		in 2015
273	17631	FITCH	8,957	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	11.64	12.36	123.34	Fixed		in 2015
274	17666	FITCH	37,043	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	48.16	51.12	510.08	Fixed		in 2015
275	17671	FITCH	1,583	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	414	2.06	2.18	21.80	Fixed		
275	17671	FITCH	2,800	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	3.64	3.86	38.56	Fixed		in 2015
275	17671	FITCH	11,375	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	414	5.12	4.78	52.55	Fixed		in 2015
276	17752	FITCH	4,081	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	436	5.31	5.63	56.20	Fixed		
276	17752	FITCH	21,463	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	436	9.66	9.01	99.16	Fixed		in 2015
277	17771	FITCH	7,246	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	436	9.42	10.00	99.78	Fixed		
278	17780	FITCH	47,920	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	436	62.30	66.13	659.86	Fixed		in 2015
279	17791	FITCH	11,368	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	436	14.78	15.69	156.54	Fixed		in 2015
279	17791	FITCH	3,459	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	436	1.56	1.45	15.98	Fixed		in 2015
280	17792	FITCH	920	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	436	1.20	1.27	12.67	Fixed		
280	17792	FITCH	14,350	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	436	18.66	19.80	197.60	Fixed		in 2015
280	17792	FITCH	18,885	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	436	8.50	7.93	87.25	Fixed		in 2015
281	17811	FITCH	16,866	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	436	21.93	23.28	232.24	Fixed		in 2015
281	17811	FITCH	2,300	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	436	1.04	0.97	10.63	Fixed		in 2015
282	17841	FITCH	1,979	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	437	2.57	2.73	27.25	Fixed		
282	17841	FITCH	3,538	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	437	4.60	4.88	48.72	Fixed		in 2015
282	17841	FITCH	10,275	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	437	4.62	4.32	47.47	Fixed		in 2015
283	17862 Unit 200	FITCH	3,142	SF	Permits Issued	121	Office	PA36	5.1	IBC Multi-Use	437	4.08	4.34	43.27	Fixed		
283	17862 Unit 700	FITCH	3,196	SF	Permits Issued	121	Office	PA36	5.1	IBC Multi-Use	437	4.15	4.41	44.01	Fixed		
283	17862 Unit 600	FITCH	3,203	SF	Permits Issued	121	Office	PA36	5.1	IBC Multi-Use	437	4.16	4.42	44.11	Fixed		
283	17862 Unit 300	FITCH	3,210	SF	Permits Issued	121	Office	PA36	5.1	IBC Multi-Use	437	4.17	4.43	44.20	Fixed		
283	17862 Unit 400	FITCH	4,608	SF	Permits Issued	121	Office	PA36	5.1	IBC Multi-Use	437	5.99	6.36	63.45	Fixed		
283	17862 Unit 100	FITCH	5,552	SF	Permits Issued	121	Office	PA36	5.1	IBC Multi-Use	437	7.22	7.66	76.45	Fixed		
283	17862 Unit 800	FITCH	5,689	SF	Permits Issued	121	Office	PA36	5.1	IBC Multi-Use	437	7.40	7.85	78.34	Fixed		
283	17862 Unit 500	FITCH	5,755	SF	Permits Issued	121	Office	PA36	5.1	IBC Multi-Use	437	7.48	7.94	79.25	Fixed		
283	17862	FITCH	7,674	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	437	9.98	10.59	105.67	Fixed		
284	17871	FITCH	1,728	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	437	2.25	2.38	23.79	Fixed		
284	17871	FITCH	3,120	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	437	4.06	4.31	42.96	Fixed		in 2015
284	17871	FITCH	11,710	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	437	5.27	4.92	54.10	Fixed		in 2015
285	17909	FITCH	2,600	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	437	3.38	3.59	35.80	Fixed		
285	17909	FITCH	4,097	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	437	5.33	5.65	56.42	Fixed		in 2015
285	17909	FITCH	7,305	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	437	3.29	3.07	33.75	Fixed		in 2015
286	17922	FITCH	19,810	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	437	25.75	27.34	272.78	Fixed		in 2015
287	17941	FITCH	13,036	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	437	16.95	17.99	179.51	Fixed		in 2015
288	17991	FITCH	920	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	430	1.20	1.27	12.67	Fixed		
288	17991	FITCH	6,165	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	8.01	8.51	84.89	Fixed		in 2015
288	17991	FITCH	6,317	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	2.84	2.65	29.18	Fixed		in 2015
289	18061	FITCH	18,041	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	23.45	24.90	248.42	Fixed		in 2015
290	18071	FITCH	20,606	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	26.79	28.44	283.74	Fixed		in 2015
290	18071	FITCH	2,639	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	1.19	1.11	12.19	Fixed		in 2015
291	2661	GATES AVE	1,658	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	431	2.16	2.29	22.83	Redev	Res Potential	
291	2661	GATES AVE	23,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	431	30.55	32.43	323.60	Redev	Res Potential	
291	2661	GATES AVE	36,900	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	431	16.61	15.50	170.48	Redev	Res Potential	
292	17042	GILLETTE AVE	14,250	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	412	18.53	19.67	196.22	Fixed		in 2015
292	17042	GILLETTE AVE	2,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	412	0.90	0.84	9.24	Fixed		in 2015
293	17100	GILLETTE AVE	20,400	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	418	26.52	28.15	280.91	Fixed		in 2015
294	17151	GILLETTE AVE	5,386	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	415	7.00	7.43	74.17	Fixed		in 2015
294	17151	GILLETTE AVE	17,246	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	415	22.42	23.80	237.48	Fixed		
294	17151	GILLETTE AVE	5,737	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	415	2.58	2.41	26.50	Fixed		in 2015
295	17161	GILLETTE AVE	2,980	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	415	3.87	4.11	41.03	Fixed		in 2015
295	17161	GILLETTE AVE	8,671	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	415	3.90	3.64	40.06	Fixed		in 2015
296	17173	GILLETTE AVE	7,784	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	415	10.12	10.74	107.19	Fixed		in 2015
296	17173	GILLETTE AVE	13,113	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	415	5.90	5.51	60.58	Fixed		in 2015
297	17192	GILLETTE AVE	1,998	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	424	2.60	2.76	27.51	Fixed		in 2015
297	17192	GILLETTE AVE	2,236	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	424	2.91	3.09	30.79	Fixed		
297	17192	GILLETTE AVE	12,815	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	424	5.77	5.38	59.21	Fixed		in 2015
298	17500	GILLETTE AVE	2,900	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	439	3.77	4.00	39.93	Fixed		
298	17500	GILLETTE AVE	10,266	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	439	13.35	14.17	141.36	Fixed		in 2015
298	17500	GILLETTE AVE	23,134	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	439	10.41	9.72	106.88	Fixed		in 2015
299	17550	GILLETTE AVE	15,166	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	439	19.72	20.93	208.84	Fixed		in 2015
299	17550	GILLETTE AVE	32,130	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	439	14.46	13.49	148.44	Fixed		in 2015
300	17590	GILLETTE AVE	14,707	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	439	19.12	20.30	202.52	Fixed		
300	17590	GILLETTE AVE	55,900	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	439	25.16	23.48	258.26	Fixed		in 2015
301	17600	GILLETTE AVE	325	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	439	0.42	0.45	4.48	Fixed		
301	17600	GILLETTE AVE	100,400	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	439	130.52	138.55	1,382.51	Fixed		in 2015
302	17802	GILLETTE AVE	17,700	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	473	23.01	24.43	243.73	Redev	Non Res Optimization	
302	17802	GILLETTE AVE	23,159	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	473	30.11	31.96	318.90	Redev	Non Res Optimization	
302	17802	GILLETTE AVE	34,789	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	473	15.66	14.61	160.73	Redev	Non Res Optimization	
303	17862	GILLETTE AVE	3,977	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	478	5.17	5.49	54.76	Fixed		

IBC Vision Plan Database Snap Shot As Of July 10, 2009

Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
303	17862	GILLETTE AVE	4,020	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	478	5.23	5.55	55.36	Fixed		in 2015
304	17809	GILLETTE AVE	555	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	471	0.72	0.77	7.64	Redev	Non Res Optimization	
304	17809	GILLETTE AVE	15,075	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	471	19.60	20.80	207.58	Redev	Non Res Optimization	
304	17809	GILLETTE AVE	27,350	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	471	12.31	11.49	126.36	Redev	Non Res Optimization	
305	17811	GILLETTE AVE	19,643	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	471	25.54	27.11	270.48	Redev	Non Res Optimization	
305	17811	GILLETTE AVE	60,623	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	471	78.81	83.66	834.78	Redev	Non Res Optimization	
305	17811	GILLETTE AVE	29,677	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	471	13.35	12.46	137.11	Redev	Non Res Optimization	
306	17821	GILLETTE AVE	-2,755	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	471	-3.58	-3.80	-37.94	Redev	Non Res Optimization	
306	17821	GILLETTE AVE	2,755	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	471	3.58	3.80	37.94	Redev	Non Res Optimization	
306	17821	GILLETTE AVE	-24,735	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	471	-11.13	-10.39	-114.28	Redev	Non Res Optimization	
306	17821	GILLETTE AVE	24,735	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	471	11.13	10.39	114.28	Redev	Non Res Optimization	
306	17821	GILLETTE AVE	101,956	SF	Discretionary Approval	161	Mini Warehouse	PA36	5.1	IBC Multi-Use	471	29.57	27.53	309.95	Redev	Non Res Optimization	
307	17822	GILLETTE AVE	7,116	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	473	9.25	9.82	97.99	Redev	Non Res Optimization	
307	17822	GILLETTE AVE	27,741	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	473	36.06	38.28	381.99	Redev	Non Res Optimization	
307	17822	GILLETTE AVE	97,399	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	473	43.83	40.91	449.98	Redev	Non Res Optimization	
308	17832	GILLETTE AVE	-36,634	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	473	-47.62	-50.55	-504.45	Redev	Non Res Optimization	
308	17832	GILLETTE AVE	36,634	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	473	47.62	50.55	504.45	Redev	Non Res Optimization	
308	17840	GILLETTE AVE	45,000	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	473	58.50	62.10	619.65	Redev	Non Res Optimization	
309	17872	GILLETTE AVE	459	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	478	0.60	0.63	6.32	Redev	Non-Res Optimization	
309	17872	GILLETTE AVE	87,120	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	478	113.26	120.23	1,199.64	Redev	Non-Res Optimization	
310	16592	HALE AVE	12,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	420	16.25	17.25	172.13	Redev	Res Potential	
310	16592	HALE AVE	5,500	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	420	2.48	2.31	25.41	Redev	Res Potential	
311	16601	HALE AVE	1,364	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	420	1.77	1.88	18.78	Fixed		
311	16601	HALE AVE	12,244	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	420	15.92	16.90	168.60	Fixed		in 2015
311	16601	HALE AVE	15,765	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	420	7.09	6.62	72.83	Fixed		in 2015
312	16632	HALE AVE	162	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	420	0.21	0.22	2.23	Redev	Res Potential	
312	16632	HALE AVE	5,607	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	420	7.29	7.74	77.21	Redev	Res Potential	
312	16632	HALE AVE	1,046	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	420	0.47	0.44	4.83	Redev	Res Potential	
312	16632	HALE AVE	13,146	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	420	5.92	5.52	60.73	Redev	Res Potential	
313	16641	HALE AVE	423	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	420	0.55	0.58	5.82	Fixed		
313	16641	HALE AVE	5,727	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	420	7.45	7.90	78.86	Fixed		in 2015
313	16641	HALE AVE	37,837	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	420	17.03	15.89	174.81	Fixed		in 2015
314	16662	HALE AVE	2,276	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	420	2.96	3.14	31.34	Redev	Res Potential	
314	16662	HALE AVE	5,120	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	420	6.66	7.07	70.50	Redev	Res Potential	
314	16662	HALE AVE	7,524	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	420	3.39	3.16	34.76	Redev	Res Potential	
315	16691	HALE AVE	14,850	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	420	19.31	20.49	204.48	Redev	Res Potential	
315	16691	HALE AVE	30,130	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	420	13.56	12.65	139.20	Redev	Res Potential	
316	16692	HALE AVE	4,696	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	420	6.10	6.48	64.66	Redev	Res Potential	
316	16692	HALE AVE	13,500	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	420	6.08	5.67	62.37	Redev	Res Potential	
317	16721	HALE AVE	550	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	420	0.72	0.76	7.57	Redev	Res Potential	
317	16721	HALE AVE	15,300	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	420	19.89	21.11	210.68	Redev	Res Potential	
317	16721	HALE AVE	18,190	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	420	8.19	7.64	84.04	Redev	Res Potential	
318	16722	HALE AVE	3,912	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	420	5.09	5.40	53.87	Redev	Res Potential	
318	16722	HALE AVE	13,280	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	420	5.98	5.58	61.35	Redev	Res Potential	
319	16750	HALE AVE	306	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	438	0.40	0.42	4.21	Redev	Res Potential	
319	16750	HALE AVE	4,885	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	438	6.35	6.74	67.27	Redev	Res Potential	
319	16750	HALE AVE	8,320	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	3.74	3.49	38.44	Redev	Res Potential	
320	16761	HALE AVE	10,180	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	438	13.23	14.05	140.18	Redev	Res Potential	
320	16761	HALE AVE	38,306	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	17.24	16.09	176.97	Redev	Res Potential	
321	16782	HALE AVE	1,238	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	438	1.61	1.71	17.05	Redev	Res Potential	
321	16782	HALE AVE	3,256	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	438	4.23	4.49	44.84	Redev	Res Potential	
321	16782	HALE AVE	11,544	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	5.19	4.85	53.33	Redev	Res Potential	
322	16811	HALE AVE	491	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	438	0.64	0.68	6.76	Redev	Res Potential	
322	16811	HALE AVE	13,743	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	438	17.87	18.97	189.24	Redev	Res Potential	
322	16811	HALE AVE	17,516	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	7.88	7.36	80.92	Redev	Res Potential	
323	16812	HALE AVE	152	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	438	0.20	0.21	2.09	Redev	Res Potential	
323	16812	HALE AVE	8,034	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	438	10.44	11.09	110.63	Redev	Res Potential	
323	16812	HALE AVE	6,421	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	2.89	2.70	29.67	Redev	Res Potential	
324	16842	HALE AVE	2,600	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	438	3.38	3.59	35.80	Redev	Res Potential	
324	16842	HALE AVE	3,035	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	438	3.95	4.19	41.79	Redev	Res Potential	
324	16842	HALE AVE	13,750	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	6.19	5.78	63.53	Redev	Res Potential	
325	16851	HALE AVE	15,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	438	19.50	20.70	206.55	Redev	Res Potential	
325	16851	HALE AVE	9,500	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	438	4.28	3.99	43.89	Redev	Res Potential	
326	16872	HALE AVE	5,648	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	438	7.34	7.79	77.77	Redev	Res Potential	
326	16872	HALE AVE	16,196	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	7.29	6.80	74.83	Redev	Res Potential	
327	16881	HALE AVE	12,525	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	438	16.28	17.28	172.47	Redev	Res Potential	
327	16881	HALE AVE	18,275	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	8.22	7.68	84.43	Redev	Res Potential	
328	2801	ALTON PKWY	1	DU	Discretionary Approval	102	Condominiums	PA36	5.3C	IBC Residential	464	0.50	0.52	6.30	Fixed		in 2015
328	2801	ALTON PKWY	178	DU	Existing	102	Condominiums	PA36	5.3C	IBC Residential	464	89.00	92.56	1,121.40	Fixed		in 2015
329	2810	WARNER AVE	192	DU	Existing	103	Apartments	PA36	5.2	IBC Industrial	411	96.00	99.84	1,209.60	Fixed		in 2015
331	0	JAMBOREE RD	22,706	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	29.52	31.33	312.66	Fixed		
332	0	JAMBOREE RD	21,148	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	27.49	29.18	291.21	Fixed		
333	16281	CONSTRUCTION CIR W	15,000	SF	Existing	121	Office	PA36	5.2	IBC Industrial	411	19.50	20.70	206.55	Fixed		in 2015
333	16281	CONSTRUCTION CIR W	46,542	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	411	60.50	64.23	640.88	Fixed		
333	16281	CONSTRUCTION CIR W	16,350	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	411	7.36	6.87	75.54	Fixed		in 2015
334	16901	JAMBOREE RD	35	DU	Density Bonus/Pending Approval	102	Condominiums	PA36	5.1	IBC Multi-Use	446	17.50	18.20	220.50	Fixed		in 2015
334	16901	JAMBOREE RD	144	DU	Pending Approval	102	Condominiums	PA36	5.1	IBC Multi-Use	446	72.00	74.88	907.20	Fixed		in 2015
334	16901	JAMBOREE RD	-9,746	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	446	-12.67	-13.45	-134.20	Fixed		
334	16901	JAMBOREE RD	-8,326	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	446	-10.82	-11.49	-114.65	Fixed		
334	16901	JAMBOREE RD	8,326	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	446	10.82	11.49	114.65	Fixed		in 2015
334	16901	JAMBOREE RD	9,746	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	446	12.67	13.45	134.20	Fixed		
334	16901	JAMBOREE RD	-40,649	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	-18.29	-17.07	-187.80	Fixed		
334	16901	JAMBOREE RD	40,649	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	18.29	17.07	187.80	Fixed		in 2015

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
335	17052	JAMBOREE RD	1,088	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	1.41	1.50	14.98	Redev	Res Potential	
335	17052	JAMBOREE RD	19,062	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	474	24.78	26.31	262.48	Redev	Res Potential	
335	17052	JAMBOREE RD	128,456	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	474	57.81	53.95	593.47	Redev	Res Potential	
336	17200	JAMBOREE RD	26,870	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	485	34.93	37.08	370.00	Redev	Potential Retail Site, otherwise residential	
336	17200	JAMBOREE RD	40,962	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	485	18.43	17.20	189.24	Redev		
337	1	PARK PLZ	224,111	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	500	291.34	309.27	3,086.01	Fixed		in 2015
337	2	PARK PLZ	224,111	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	500	291.34	309.27	3,086.01	Fixed		in 2015
337	17900	JAMBOREE RD	423,500	SF	Existing	11	Hotel	PA36	5.1	IBC Multi-Use	505	0.00	0.00	0.00	Fixed		in 2015
337	17900	JAMBOREE RD	526	ROOM	Existing	111	HOTEL - ITAM	PA36	5.1	IBC Multi-Use	505	220.92	357.68	5,260.00	Fixed		in 2015
337	17900	JAMBOREE RD	1,124	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	505	0.51	0.47	5.19	Fixed		in 2015
338	NULL	ROCKEFELLER	16	DU	Discretionary Approval	102	Condominiums	PA36	5.0A	IBC Mixed-Use	508	8.00	8.32	100.80	Fixed		in 2015
338	0	DELANCY	23	DU	Discretionary Approval	102	Condominiums	PA36	5.0A	IBC Mixed-Use	508	11.50	11.96	144.90	Fixed		in 2015
338	0	SOHO	49	DU	Discretionary Approval	102	Condominiums	PA36	5.0A	IBC Mixed-Use	508	24.50	25.48	308.70	Fixed		in 2015
338	27	TRIBECA	62	DU	Discretionary Approval	102	Condominiums	PA36	5.0A	IBC Mixed-Use	508	31.00	32.24	390.60	Fixed		in 2015
338	402	ROCKEFELLER	72	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	508	36.00	37.44	453.60	Fixed		in 2015
338	405	ROCKEFELLER	88	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	508	44.00	45.76	554.40	Fixed		in 2015
338	401	ROCKEFELLER	152	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	508	76.00	79.04	957.60	Fixed		in 2015
338	313	ROCKEFELLER	175	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	508	87.50	91.00	1,102.50	Fixed		in 2015
338	303	ROCKEFELLER	190	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	508	95.00	98.80	1,197.00	Fixed		in 2015
338	3	DELANCY	4	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	2.00	2.08	25.20	Fixed		in 2015
338	3	SOHO	4	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	2.00	2.08	25.20	Fixed		in 2015
338	733	ROCKEFELLER	4	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	2.00	2.08	25.20	Fixed		in 2015
338	11	DELANCY	5	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	2.50	2.60	31.50	Fixed		in 2015
338	23	DELANCY	5	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	2.50	2.60	31.50	Fixed		in 2015
338	23	GRAMERCY	5	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	2.50	2.60	31.50	Fixed		in 2015
338	99	LENNOX	6	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	3.00	3.12	37.80	Fixed		in 2015
338	3	WALDORF	9	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	4.50	4.68	56.70	Fixed		in 2015
338	573	ROCKEFELLER	9	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	4.50	4.68	56.70	Fixed		in 2015
338	591	ROCKEFELLER	9	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	4.50	4.68	56.70	Fixed		in 2015
338	609	ROCKEFELLER	9	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	4.50	4.68	56.70	Fixed		in 2015
338	700	ROCKEFELLER	9	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	4.50	4.68	56.70	Fixed		in 2015
338	716	ROCKEFELLER	9	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	4.50	4.68	56.70	Fixed		in 2015
338	800	ROCKEFELLER	10	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	5.00	5.20	63.00	Fixed		in 2015
338	NULL	ROCKEFELLER	18	DU	Discretionary Approval	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	9.00	9.36	113.40	Fixed		in 2015
338	0	DELANCY	26	DU	Discretionary Approval	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	13.00	13.52	163.80	Fixed		in 2015
338	0	SOHO	49	DU	Discretionary Approval	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	24.50	25.48	308.70	Fixed		in 2015
338	NULL	ROCKEFELLER	65	DU	Discretionary Approval	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	32.50	33.80	409.50	Fixed		in 2015
338	21	GRAMERCY	87	DU	Permits Issued	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	43.50	45.24	548.10	Fixed		in 2015
338	15	ROCKEFELLER	211	DU	Discretionary Approval	102	Condominiums	PA36	5.0A	IBC Mixed-Use	515	105.50	109.72	1,329.30	Fixed		in 2015
338	15	ROCKEFELLER	19,700	SF	Discretionary Approval	109	Commercial (EQ)	PA36	5.0A	IBC Mixed-Use	515	50.04	137.11	1,654.80	Fixed		in 2015
338	15	ROCKEFELLER	90,000	SF	Discretionary Approval	121	Office	PA36	5.0A	IBC Mixed-Use	515	117.00	124.20	1,239.30	Fixed		in 2015
339	18691	JAMBOREE RD	0	SF	Pending Approval	11	Hotel	PA36	5.1	IBC Multi-Use	535	0.00	0.00	0.00	Fixed		in 2015
339	18691	JAMBOREE RD	26,000	SF	Pending Approval	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	535	66.04	180.96	2,184.00	Fixed		in 2015
339	18691	JAMBOREE RD	250	ROOM	Pending Approval	111	HOTEL - ITAM	PA36	5.1	IBC Multi-Use	535	105.00	170.00	2,500.00	Fixed		in 2015
339	18691	JAMBOREE RD	-448,462	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	535	-583.00	-618.88	-6,175.32	Fixed		
339	18691	JAMBOREE RD	197,130	SF	Pending Approval	121	Office	PA36	5.1	IBC Multi-Use	535	256.27	272.04	2,714.48	Fixed		in 2015
339	18691	JAMBOREE RD	448,462	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	535	583.00	618.88	6,175.32	Fixed		
340	30	VIA LUCCA	123	DU	Existing	103	Apartments	PA36	5.3A	IBC Residential	544	61.50	63.96	774.90	Fixed		in 2015
340	10	VIA RICASOL	124	DU	Existing	103	Apartments	PA36	5.3A	IBC Residential	544	62.00	64.48	781.20	Fixed		in 2015
340	20	VIA LUCCA	124	DU	Existing	103	Apartments	PA36	5.3A	IBC Residential	544	62.00	64.48	781.20	Fixed		in 2015
340	25	VIA LUCCA	192	DU	Existing	103	Apartments	PA36	5.3A	IBC Residential	544	96.00	99.84	1,209.60	Fixed		in 2015
341	19530	JAMBOREE RD	7,530	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	546	19.13	52.41	632.52	Fixed		in 2015
341	19540	JAMBOREE RD	37,290	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	546	94.72	259.54	3,132.36	Fixed		in 2015
341	19520	JAMBOREE RD	106,046	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	546	137.86	146.34	1,460.25	Fixed		in 2015
341	19510	JAMBOREE RD	107,211	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	546	139.37	147.95	1,476.30	Fixed		
341	19540	JAMBOREE RD	113,945	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	546	148.13	157.24	1,569.02	Fixed		in 2015
341	19500	JAMBOREE RD	199,531	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	546	259.39	275.35	2,747.54	Fixed		in 2015
342	1641	KAISER AVE	12,100	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	428	15.73	16.70	166.62	Fixed		in 2015
343	1642	KAISER AVE	9,370	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	12.18	12.93	129.02	Fixed		in 2015
343	1642	KAISER AVE	3,230	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	434	1.45	1.36	14.92	Fixed		in 2015
344	1672	KAISER AVE	2,457	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	434	3.19	3.39	33.83	Fixed		
344	1672	KAISER AVE	3,085	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	4.01	4.26	42.48	Fixed		in 2015
344	1672	KAISER AVE	7,977	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	434	3.59	3.35	36.85	Fixed		in 2015
345	1701	KAISER AVE	2,401	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	428	3.12	3.31	33.06	Fixed		in 2015
345	1701	KAISER AVE	5,930	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	428	7.71	8.18	81.66	Fixed		
345	1701	KAISER AVE	22,599	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	428	10.17	9.49	104.41	Fixed		in 2015
346	1702	KAISER AVE	3,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	3.90	4.14	41.31	Fixed		in 2015
346	1702	KAISER AVE	6,335	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	434	8.24	8.74	87.23	Fixed		
346	1702	KAISER AVE	11,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	434	4.95	4.62	50.82	Fixed		in 2015
347	1732	KAISER AVE	9,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	11.70	12.42	123.93	Fixed		in 2015
347	1732	KAISER AVE	8,155	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	434	3.67	3.43	37.68	Fixed		in 2015
348	1733	KAISER AVE	2,388	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	428	3.10	3.30	32.88	Fixed		in 2015
348	1733	KAISER AVE	2,668	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	428	3.47	3.68	36.74	Fixed		
348	1733	KAISER AVE	9,414	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	428	4.24	3.95	43.49	Fixed		in 2015
349	1760	KAISER AVE	2,297	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	434	2.99	3.17	31.63	Fixed		
349	1760	KAISER AVE	2,900	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	3.77	4.00	39.93	Fixed		in 2015
349	1760	KAISER AVE	8,956	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	434	4.03	3.76	41.38	Fixed		in 2015
350	1761	KAISER AVE	1,997	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	428	2.60	2.76	27.50	Fixed		
350	1761	KAISER AVE	3,120	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	428	4.06	4.31	42.96	Fixed		in 2015
350	1761	KAISER AVE	10,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	428	4.50	4.20	46.20	Fixed		in 2015
351	1791	KAISER AVE	4,679	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	428	6.08	6.46	64.43	Fixed		in 2015
351	1791	KAISER AVE	5,385	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	428	7.00	7.43	74.15	Fixed		
351	1791	KAISER AVE	8,226	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	428	3.70	3.45	38.00	Fixed		in 2015

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
352	1792	KAISER AVE	966	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	434	1.26	1.33	13.30	Fixed		
352	1792	KAISER AVE	4,635	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	6.03	6.40	63.82	Fixed		in 2015
352	1792	KAISER AVE	6,650	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	434	2.99	2.79	30.72	Fixed		in 2015
353	1811	KAISER AVE	654	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	428	0.85	0.90	9.01	Fixed		
353	1811	KAISER AVE	5,190	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	428	6.75	7.16	71.47	Fixed		in 2015
353	1811	KAISER AVE	7,800	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	428	3.51	3.28	36.04	Fixed		in 2015
354	1824	KAISER AVE	1,637	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	434	2.13	2.26	22.54	Fixed		
354	1824	KAISER AVE	3,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	3.90	4.14	41.31	Fixed		in 2015
354	1824	KAISER AVE	10,800	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	434	4.86	4.54	49.90	Fixed		in 2015
355	1851	KAISER AVE	312	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	428	0.41	0.43	4.30	Fixed		
355	1851	KAISER AVE	4,520	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	428	5.88	6.24	62.24	Fixed		in 2015
355	1851	KAISER AVE	10,312	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	428	4.64	4.33	47.64	Fixed		in 2015
356	1854	KAISER AVE	3,648	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	4.74	5.03	50.23	Fixed		in 2015
356	1854	KAISER AVE	17,664	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	434	7.95	7.42	81.61	Fixed		in 2015
357	1881	KAISER AVE	191	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	428	0.25	0.26	2.63	Fixed		
357	1881	KAISER AVE	6,960	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	428	9.05	9.60	95.84	Fixed		in 2015
357	1881	KAISER AVE	9,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	428	4.05	3.78	41.58	Fixed		in 2015
358	2552	KELVIN AVE	6	DU	Discretionary Approval	103	Apartments	PA36	5.3	IBC Residential	486	3.00	3.12	37.80	Fixed		in 2015
358	2552	KELVIN AVE	132	DU	Existing	103	Apartments	PA36	5.3	IBC Residential	486	66.00	68.64	831.60	Fixed		in 2015
359	2681	KELVIN AVE	21,129	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	481	27.47	29.16	290.95	Redev	Non-Res Optimization	
359	2681	KELVIN AVE	67,298	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	481	87.49	92.87	926.69	Redev	Non-Res Optimization	
359	2681	KELVIN AVE	126,767	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	481	57.05	53.24	585.66			
360	2750	KELVIN AVE	403	DU	Existing	103	Apartments	PA36	5.3	IBC Residential	486	201.50	209.56	2,538.90	Fixed		in 2015
361	2801	KELVIN AVE	248	DU	Discretionary Approval	102	Condominiums	PA36	5.3C	IBC Residential	485	124.00	128.96	1,562.40	Fixed		in 2015
361	2801	KELVIN AVE	1,458	SF	Additional Zoning Potential	121	Office	PA36	5.3C	IBC Residential	485	1.90	2.01	20.08	Fixed		
362	2802	KELVIN AVE	2,136	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	492	2.78	2.95	29.41	Redev	Res Potential	
362	2802	KELVIN AVE	20,450	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	492	26.59	28.22	281.60	Redev	Res Potential	
362	2802	KELVIN AVE	45,864	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	492	20.64	19.26	211.89	Redev	Res Potential	
363	2838	KELVIN AVE	-12,689	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	492	-16.50	-17.51	-174.73	Fixed		
363	2838	KELVIN AVE	12,689	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	492	16.50	17.51	174.73	Fixed		
364	2852	KELVIN AVE	28	DU	Density Bonus/Pending Approval	102	Condominiums	PA36	5.1	IBC Multi-Use	492	14.00	14.56	176.40	Fixed		in 2015
364	2852	KELVIN AVE	166	DU	Pending Approval	102	Condominiums	PA36	5.1	IBC Multi-Use	492	83.00	86.32	1,045.80	Fixed		in 2015
364	2852	KELVIN AVE	-15,900	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	492	-20.67	-21.94	-218.94	Fixed		
364	2852	KELVIN AVE	-5,458	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	492	-7.10	-7.53	-75.16	Fixed		
364	2852	KELVIN AVE	5,458	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	492	7.10	7.53	75.16	Fixed		
364	2852	KELVIN AVE	15,900	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	492	20.67	21.94	218.94	Fixed		in 2015
364	2852	KELVIN AVE	-13,398	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	492	-6.03	-5.63	-61.90	Fixed		
364	2852	KELVIN AVE	13,398	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	492	6.03	5.63	61.90	Fixed		in 2015
365	2892	KELVIN AVE	27,438	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	492	35.67	37.86	377.82	Redev	Res Potential	
365	2892	KELVIN AVE	91,228	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	492	41.05	38.32	421.47	Redev	Res Potential	
366	1681	KETTERING ST	7,094	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	412	9.22	9.79	97.68	Fixed		in 2015
366	1691	KETTERING ST	9,403	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	412	12.22	12.98	129.48	Fixed		in 2015
366	1681	KETTERING ST	3,721	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	412	1.67	1.56	17.19	Fixed		in 2015
366	1691	KETTERING ST	4,932	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	412	2.22	2.07	22.79	Fixed		in 2015
367	1682	KETTERING ST	2,149	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	418	2.79	2.97	29.59	Fixed		
367	1682	KETTERING ST	4,080	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	418	5.30	5.63	56.18	Fixed		in 2015
367	1682	KETTERING ST	23,120	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	418	10.40	9.71	106.81	Fixed		in 2015
368	1711	KETTERING ST	4,976	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	412	6.47	6.87	68.52	Fixed		
368	1711	KETTERING ST	6,062	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	412	7.88	8.37	83.47	Fixed		in 2015
368	1711	KETTERING ST	6,848	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	412	3.08	2.88	31.64	Fixed		in 2015
369	1722	KETTERING ST	4,173	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	418	5.42	5.76	57.46	Fixed		
369	1722	KETTERING ST	4,718	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	418	6.13	6.51	64.97	Fixed		in 2015
369	1722	KETTERING ST	15,242	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	418	6.86	6.40	70.42	Fixed		in 2015
370	1751	KETTERING ST	2,956	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	412	3.84	4.08	40.70	Fixed		
370	1751	KETTERING ST	4,367	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	412	5.68	6.03	60.13	Fixed		in 2015
370	1751	KETTERING ST	18,433	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	412	8.29	7.74	85.16	Fixed		in 2015
371	1762	KETTERING ST	12,440	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	418	16.17	17.17	171.30	Fixed		in 2015
371	1762	KETTERING ST	18,595	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	418	8.37	7.81	85.91	Fixed		in 2015
372	1801	KETTERING ST	627	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	412	0.82	0.87	8.63	Fixed		in 2015
372	1801	KETTERING ST	4,957	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	412	6.44	6.84	68.26	Fixed		
372	1801	KETTERING ST	24,504	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	412	11.03	10.29	113.21	Fixed		in 2015
373	1802	KETTERING ST	2,785	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	418	3.62	3.84	38.35	Fixed		in 2015
373	1802	KETTERING ST	3,094	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	418	4.02	4.27	42.60	Fixed		
373	1802	KETTERING ST	23,015	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	418	10.36	9.67	106.33	Fixed		in 2015
374	1821	KETTERING ST	2,957	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	412	3.84	4.08	40.72	Fixed		
374	1821	KETTERING ST	4,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	412	5.20	5.52	55.08	Fixed		in 2015
374	1821	KETTERING ST	18,700	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	412	8.42	7.85	86.39	Fixed		in 2015
375	1851	KETTERING ST	6,324	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	412	8.22	8.73	87.08	Fixed		
375	1851	KETTERING ST	21,540	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	412	9.69	9.05	99.51	Fixed		in 2015
376	1881	KETTERING ST	3,103	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	412	4.03	4.28	42.73	Fixed		in 2015
376	1881	KETTERING ST	3,558	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	412	4.63	4.91	48.99	Fixed		
376	1881	KETTERING ST	20,050	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	412	9.02	8.42	92.63	Fixed		in 2015
377	1641	LANGLEY AVE	3,761	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	418	4.89	5.19	51.79	Fixed		
377	1641	LANGLEY AVE	5,805	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	418	7.55	8.01	79.93	Fixed		in 2015
377	1641	LANGLEY AVE	5,688	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	418	2.56	2.39	26.28	Fixed		in 2015
378	1681	LANGLEY AVE	7,100	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	418	9.23	9.80	97.77	Fixed		in 2015
378	1681	LANGLEY AVE	7,075	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	418	3.18	2.97	32.69	Fixed		in 2015
379	1682	LANGLEY AVE	13,156	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	424	17.10	18.16	181.16	Fixed		in 2015
380	1711	LANGLEY AVE	7,768	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	418	10.10	10.72	106.97	Fixed		in 2015
380	1711	LANGLEY AVE	8,982	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	418	4.04	3.77	41.50	Fixed		in 2015
381	1752	LANGLEY AVE	1,494	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	424	1.94	2.06	20.57	Fixed		
381	1712	LANGLEY AVE	2,200	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	424	2.86	3.04	30.29	Fixed		in 2015
381	1712	LANGLEY AVE	2,312	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	424	3.01	3.19	31.84	Fixed		

IBC Vision Plan Database Snap Shot As Of July 10, 2009

Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
381	1752	LANGLEY AVE	7,353	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	424	9.56	10.15	101.25	Fixed		in 2015
381	1752	LANGLEY AVE	8,519	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	424	3.83	3.58	39.36	Fixed		in 2015
381	1712	LANGLEY AVE	12,600	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	424	5.67	5.29	58.21	Fixed		in 2015
382	1751	LANGLEY AVE	894	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	418	1.16	1.23	12.31	Fixed		
382	1751	LANGLEY AVE	4,486	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	418	5.83	6.19	61.77	Fixed		in 2015
382	1751	LANGLEY AVE	9,388	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	418	4.22	3.94	43.37	Fixed		in 2015
383	1781	LANGLEY AVE	4,750	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	418	6.18	6.56	65.41	Fixed		in 2015
383	1781	LANGLEY AVE	5,815	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	418	7.56	8.02	80.07	Fixed		
383	1781	LANGLEY AVE	20,632	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	418	9.28	8.67	95.32	Fixed		in 2015
384	1782	LANGLEY AVE	2,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	424	3.25	3.45	34.43	Fixed		in 2015
384	1782	LANGLEY AVE	2,984	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	424	3.88	4.12	41.09	Fixed		
384	1782	LANGLEY AVE	10,169	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	424	4.58	4.27	46.98	Fixed		in 2015
385	1822	LANGLEY AVE	1,630	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	424	2.12	2.25	22.45	Fixed		
385	1822	LANGLEY AVE	4,200	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	424	5.46	5.80	57.83	Fixed		in 2015
385	1822	LANGLEY AVE	9,098	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	424	4.09	3.82	42.03	Fixed		in 2015
386	1851	LANGLEY AVE	244	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	418	0.32	0.34	3.36	Fixed		
386	1851	LANGLEY AVE	5,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	418	6.50	6.90	68.85	Fixed		in 2015
386	1851	LANGLEY AVE	9,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	418	4.05	3.78	41.58	Fixed		in 2015
387	1852	LANGLEY AVE	4,326	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	424	5.62	5.97	59.57	Fixed		
387	1852	LANGLEY AVE	13,909	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	424	6.26	5.84	64.26	Fixed		in 2015
388	1881	LANGLEY AVE	7,560	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	418	9.83	10.43	104.10	Fixed		in 2015
388	1881	LANGLEY AVE	5,320	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	418	2.39	2.23	24.58	Fixed		in 2015
389	17551	MAC ARTHUR BLVD	1,760	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	426	4.47	12.25	147.84	Fixed		in 2015
389	17551	MAC ARTHUR BLVD	3,442	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	426	4.47	4.75	47.40	Fixed		
390	17897	MAC ARTHUR BLVD	6,690	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	470	16.99	46.56	561.96	Fixed		in 2015
390	17897	MAC ARTHUR BLVD	922	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	470	1.20	1.27	12.70	Fixed		
391	17901	MAC ARTHUR BLVD	1,855	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	475	4.71	12.91	155.82	Fixed		in 2015
391	17971	MAC ARTHUR BLVD	2,903	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	475	7.37	20.20	243.85	Fixed		in 2015
391	17913	MAC ARTHUR BLVD	4,372	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	475	11.10	30.43	367.25	Fixed		in 2015
391	17951	MAC ARTHUR BLVD	5,022	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	475	12.76	34.95	421.85	Fixed		in 2015
391	17921	MAC ARTHUR BLVD	12,982	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	475	32.97	90.35	1,090.49	Fixed		in 2015
391	17901	MAC ARTHUR BLVD	3,860	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	475	5.02	5.33	53.15	Fixed		in 2015
391	17901	MAC ARTHUR BLVD	8,462	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	475	11.00	11.68	116.52	Fixed		
392	18482	MAC ARTHUR BLVD	10,167	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	493	25.82	70.76	854.03	Fixed		in 2015
392	18482	MAC ARTHUR BLVD	1,525	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	493	1.98	2.10	21.00	Fixed		
393	18512	MAC ARTHUR BLVD	5,325	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	493	13.53	37.06	447.30	Fixed		in 2015
393	18512	MAC ARTHUR BLVD	7,843	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	493	10.20	10.82	108.00	Fixed		
394	18542	MAC ARTHUR BLVD	10,000	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	506	25.40	69.60	840.00	Fixed		in 2015
395	18552	MAC ARTHUR BLVD	8,369	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	506	21.26	58.25	703.00	Fixed		in 2015
395	18552	MAC ARTHUR BLVD	62,073	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	506	80.69	85.66	854.75	Fixed		in 2015
396	18622	MAC ARTHUR BLVD	750	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	511	1.91	5.22	63.00	Fixed		in 2015
396	18622	MAC ARTHUR BLVD	65,945	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	511	85.73	91.00	908.06	Fixed		in 2015
397	18692	MAC ARTHUR BLVD	1,999	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	511	5.08	13.91	167.92	Fixed		in 2015
397	18692	MAC ARTHUR BLVD	19,954	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	511	25.94	27.54	274.77	Fixed		
398	18700	MAC ARTHUR BLVD	149,672	SF	Existing	11	Hotel	PA36	5.1	IBC Multi-Use	511	0.00	0.00	0.00	Fixed		in 2015
398	18700	MAC ARTHUR BLVD	9,262	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	511	23.53	64.46	778.01	Fixed		in 2015
398	18700	MAC ARTHUR BLVD	215	ROOM	Existing	111	HOTEL - ITAM	PA36	5.1	IBC Multi-Use	511	90.30	146.20	2,150.00	Fixed		in 2015
399	18800	MAC ARTHUR BLVD	153,720	SF	Existing	11	Hotel	PA36	5.1	IBC Multi-Use	519	0.00	0.00	0.00	Fixed		in 2015
399	18800	MAC ARTHUR BLVD	293	ROOM	Existing	111	HOTEL - ITAM	PA36	5.1	IBC Multi-Use	519	123.06	199.24	2,930.00	Fixed		in 2015
401	18912	MAC ARTHUR BLVD	9,450	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	522	24.00	65.77	793.80	Fixed		in 2015
402	18952	MAC ARTHUR BLVD	47,118	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	522	61.25	65.02	648.81	Fixed		in 2015
403	19000	MAC ARTHUR BLVD	137,700	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	531	179.01	190.03	1,896.13	Fixed		in 2015
404	19712	MAC ARTHUR BLVD	919	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	546	1.19	1.27	12.65	Fixed		
404	19712	MAC ARTHUR BLVD	24,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	546	31.20	33.12	330.48	Fixed		in 2015
405	19732	MAC ARTHUR BLVD	18,683	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	546	47.45	130.03	1,569.37	Fixed		in 2015
405	19732	MAC ARTHUR BLVD	5,761	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	546	7.49	7.95	79.33	Fixed		in 2015
405	19722	MAC ARTHUR BLVD	19,456	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	546	25.29	26.85	267.91	Fixed		in 2015
406	19742	MAC ARTHUR BLVD	24,261	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	546	31.54	33.48	334.07	Fixed		in 2015
407	19752	MAC ARTHUR BLVD	19,344	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	546	25.15	26.69	266.37	Fixed		in 2015
408	19762	MAC ARTHUR BLVD	37,018	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	546	48.12	51.08	509.74	Fixed		in 2015
409	19772	MAC ARTHUR BLVD	23,888	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	546	31.05	32.97	328.94	Fixed		in 2015
410	19782	MAC ARTHUR BLVD	38,964	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	546	50.65	53.77	536.53	Fixed		in 2015
411	19900	MAC ARTHUR BLVD	800	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	546	2.03	5.57	67.20	Fixed		in 2015
411	19800	MAC ARTHUR BLVD	4,517	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	546	11.47	31.44	379.43	Fixed		in 2015
411	19900	MAC ARTHUR BLVD	2,858	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	546	3.72	3.94	39.35	Fixed		
411	19800	MAC ARTHUR BLVD	307,978	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	546	400.37	425.01	4,240.86	Fixed		in 2015
411	19900	MAC ARTHUR BLVD	315,147	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	546	409.69	434.90	4,339.57	Fixed		in 2015
411	19800	MAC ARTHUR BLVD	18,310	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	546	8.24	7.69	84.59	Fixed		in 2015
413	0	MAIN ST	9,326	SF	Discretionary Approval	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	484	23.69	64.91	783.38	Fixed		
413	1910	MAIN ST	10,462	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	484	26.57	72.82	878.81	Fixed		in 2015
413	2000	MAIN ST	12,820	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	484	32.56	89.23	1,076.88	Fixed		in 2015
413	1920	MAIN ST	13,955	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	484	35.45	97.13	1,172.22	Fixed		in 2015
413	2010	MAIN ST	15,232	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	484	38.69	106.01	1,279.49	Fixed		in 2015
413	1980	MAIN ST	112,331	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	484	285.32	781.82	9,435.80	Fixed		in 2015
413	1920	MAIN ST	871	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	484	1.13	1.20	11.99	Fixed		
413	0	MAIN ST	4,838	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	484	6.29	6.68	66.62	Fixed		
413	1900	MAIN ST	178,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	484	231.40	245.64	2,451.06	Fixed		in 2015
413	2010	MAIN ST	280,912	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	484	365.19	387.66	3,868.16	Fixed		in 2015
413	1920	MAIN ST	282,189	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	484	366.85	389.42	3,885.74	Fixed		in 2015
413	1920	MAIN ST	29,168	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	484	13.13	12.25	134.76	Fixed		in 2015
413	2010	MAIN ST	29,168	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	484	13.13	12.25	134.76	Fixed		in 2015
413	2120	MAIN ST	227,081	SF	Existing	11	Hotel	PA36	5.1	IBC Multi-Use	487	0.00	0.00	0.00	Fixed		in 2015
413	0	MAIN ST	4,922	SF	Discretionary Approval	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	487	12.50	34.26	413.45	Fixed		

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
413	2120	MAIN ST	293	ROOM	Existing	111	HOTEL - ITAM	PA36	5.1	IBC Multi-Use	487	123.06	199.24	2,930.00	Fixed		in 2015
413	0	MAIN ST	2,554	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	487	3.32	3.52	35.17	Fixed		
413	17911	VON KARMAN AVE	104,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	487	135.20	143.52	1,432.08	Fixed		in 2015
413	17901	VON KARMAN AVE	275,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	487	357.50	379.50	3,786.75	Fixed		in 2015
413	0	MAIN ST	6,994	SF	Discretionary Approval	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	488	17.76	48.68	587.50	Fixed		
413	0	MAIN ST	3,629	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	488	4.72	5.01	49.97	Fixed		
413	2020	MAIN ST	282,390	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	488	367.11	389.70	3,888.51	Fixed		in 2015
413	2040	MAIN ST	308,430	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	488	400.96	425.63	4,247.08	Fixed		in 2015
413	2050	MAIN ST	328,537	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	488	427.10	453.38	4,523.95	Fixed		in 2015
413	2030	MAIN ST	364,255	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	488	473.53	502.67	5,015.79	Fixed		in 2015
413	2040	MAIN ST	14,116	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	488	6.35	5.93	65.22	Fixed		in 2015
413	17941	VON KARMAN AVE	194,000	SF	Existing	11	Hotel	PA36	5.1	IBC Multi-Use	494	0.00	0.00	0.00	Fixed		in 2015
413	0	MAIN ST	2,419	SF	Discretionary Approval	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	494	6.14	16.84	203.20	Fixed		
413	17941	VON KARMAN AVE	340	ROOM	Existing	111	HOTEL - ITAM	PA36	5.1	IBC Multi-Use	494	142.80	231.20	3,400.00	Fixed		in 2015
413	0	MAIN ST	2,419	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	494	3.14	3.34	33.31	Fixed		
413	17931	VON KARMAN AVE	65,000	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	494	84.50	89.70	895.05	Fixed		
413	2100	MAIN ST	110,165	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	494	143.21	152.03	1,516.97	Fixed		in 2015
414	1095	MAIN ST	2,223	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	430	2.89	3.07	30.61	Fixed		
414	1095	MAIN ST	14,918	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	19.39	20.59	205.42	Fixed		in 2015
414	1095	MAIN ST	12,720	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	5.72	5.34	58.77	Fixed		in 2015
415	1100	MAIN ST	17,790	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	452	23.13	24.55	244.97	Fixed		in 2015
416	18200	MCDURMOTT	8,434	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	452	10.96	11.64	116.14	Fixed		in 2015
416	1124	MAIN ST	11,529	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	452	14.99	15.91	158.75	Fixed		in 2015
416	1176	MAIN ST	11,529	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	452	14.99	15.91	158.75	Fixed		in 2015
416	1150	MAIN ST	11,574	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	452	15.05	15.97	159.37	Fixed		in 2015
416	18226	MCDURMOTT	12,610	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	452	16.39	17.40	173.64	Fixed		in 2015
416	18195	MCDURMOTT	14,024	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	452	18.23	19.35	193.11	Fixed		in 2015
416	18207	MCDURMOTT	14,024	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	452	18.23	19.35	193.11	Fixed		in 2015
416	18242	MCDURMOTT	16,184	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	452	21.04	22.33	222.85	Fixed		in 2015
417	1200	MAIN ST	42,686	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	452	55.49	58.91	587.79	Fixed		in 2015
418	1901	MAIN ST	2,669	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	471	6.78	18.58	224.20	Fixed		in 2015
418	1901	MAIN ST	175,514	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	471	228.17	242.21	2,416.83	Fixed		in 2015
419	1929	MAIN ST	40,991	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	471	53.29	56.57	564.45	Redev	Non-Res Optimization	
419	1929	MAIN ST	3,712	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	471	1.67	1.56	17.15	Redev	Non-Res Optimization	
420	2031	MAIN ST	1,609	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	471	2.09	2.22	22.16	Redev	Non-Res Optimization	
420	2031	MAIN ST	14,291	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	471	18.58	19.72	196.79	Redev	Non-Res Optimization	
420	2031	MAIN ST	35,875	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	471	16.14	15.07	165.74	Redev	Non-Res Optimization	
421	2055	MAIN ST	3,789	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	471	4.93	5.23	52.17	Redev	Non-Res Optimization	
421	2055	MAIN ST	10,191	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	471	13.25	14.06	140.33	Redev	Non-Res Optimization	
421	2055	MAIN ST	37,392	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	471	16.83	15.70	172.75	Redev	Non-Res Optimization	
422	2300	MAIN ST	130,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	491	169.65	180.09	1,796.99	Redev	Res Potential	
422	2300	MAIN ST	242,497	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	491	315.25	334.65	3,339.18	Redev	Res Potential	
422	2320	MAIN ST	170	ROOM	Discretionary Approval	162	Hotel-Extended Stay	PA36	5.1	IBC Multi-Use	491	64.60	71.40	873.80	Fixed		in 2015
423	2323	MAIN ST	803	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	483	1.04	1.11	11.06	Redev	Non-Res Optimization	
423	2323	MAIN ST	49,251	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	483	64.03	67.97	678.19	Redev	Non-Res Optimization	
423	2323	MAIN ST	190,763	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	483	85.84	80.12	881.33	Redev	Non-Res Optimization	
425	2355	MAIN ST	2,669	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	482	3.47	3.68	36.75	Redev	Non-Res Optimization	
425	2355	MAIN ST	76,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	482	98.80	104.88	1,046.52	Redev	Non-Res Optimization	
425	2355	MAIN ST	6,509	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	482	2.93	2.73	30.07	Redev	Non-Res Optimization	
426	2500	MAIN ST	10,854	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	495	14.11	14.98	149.46	Redev	Res Potential	
426	2500	MAIN ST	40,092	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	495	18.04	16.84	185.23	Redev	Res Potential	
427	2540	MAIN ST	24,417	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	495	62.02	169.94	2,051.03	Fixed		in 2015
428	2701	MAIN ST	86,700	SF	Existing	11	Hotel	PA36	5.1	IBC Multi-Use	490	0.00	0.00	0.00	Fixed		in 2015
428	2555	MAIN ST	481	DU	Permits Issued	103	Apartments	PA36	5.3B	IBC Residential	490	240.50	250.12	3,030.30	Fixed		in 2015
428	2603	MAIN ST	2,604	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	490	6.61	18.12	218.74	Fixed		in 2015
428	2605	MAIN ST	5,786	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	490	14.70	40.27	486.02	Fixed		in 2015
428	2607	MAIN ST	6,730	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	490	17.09	46.84	565.32	Fixed		in 2015
428	2701	MAIN ST	153	ROOM	Existing	111	HOTEL - ITAM	PA36	5.1	IBC Multi-Use	490	64.26	104.04	1,530.00	Fixed		in 2015
428	2555	MAIN ST	31,539	SF	Additional Zoning Potential	121	Office	PA36	5.3B	IBC Residential	490	41.00	43.52	434.29	Fixed		
428	2603	MAIN ST	57,674	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	490	74.98	79.59	794.17	Fixed		
428	2603	MAIN ST	236,919	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	490	307.99	326.95	3,262.37	Fixed		in 2015
428	2601	MAIN ST	239,523	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	490	311.38	330.54	3,298.23	Fixed		in 2015
429	2590	MAIN ST	7,699	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	495	10.01	10.62	106.02	Redev	Potential Retail Site, otherwise residential	
429	2590	MAIN ST	35,652	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	495	16.04	14.97	164.71	Redev	Potential Retail Site, otherwise residential	
430	2640	MAIN ST	12,819	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	495	16.66	17.69	176.52	Fixed		
430	2640	MAIN ST	14,838	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	495	19.29	20.48	204.32	Fixed		in 2015
430	2640	MAIN ST	37,634	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	495	16.94	15.81	173.87	Fixed		in 2015
431	2772	MAIN ST	5,061	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	495	6.58	6.98	69.69	Redev	Res Potential	
431	2772	MAIN ST	9,672	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	495	12.57	13.35	133.18	Redev	Res Potential	
431	2772	MAIN ST	31,479	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	495	14.17	13.22	145.43	Redev	Res Potential	
432	2855	MAIN ST	142,000	SF	Existing	11	Hotel-Extended Stay	PA36	5.1	IBC Multi-Use	497	0.00	0.00	0.00	Fixed		in 2015
432	2825	MAIN ST	7,408	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	497	18.82	51.56	622.27	Fixed		in 2015
432	2855	MAIN ST	25,346	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	497	32.95	34.98	349.01	Fixed		
432	2855	MAIN ST	174	ROOM	Existing	162	HOTEL-EXTENDED STAY - IT/	PA36	5.1	IBC Multi-Use	497	66.12	73.08	894.36	Fixed		in 2015
433	2955	MAIN ST	12,999	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	497	16.90	17.94	179.00	Fixed		
433	2955	MAIN ST	28,815	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	497	37.46	39.76	396.78	Fixed		in 2015
433	2951	MAIN ST	2,336	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	497	1.05	0.98	10.79	Fixed		in 2015
435	2192	MARTIN	27,969	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	530	36.36	38.60	385.13	Redev	Res Potential	
436	18872	MAC ARTHUR BLVD	21,000	SF	Discretionary Approval	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	522	53.34	146.16	1,764.00	Fixed		
436	18872	MAC ARTHUR BLVD	-49,104	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	522	-63.84	-67.76	-676.16	Fixed		
436	18872	MAC ARTHUR BLVD	49,104	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	522	63.84	67.76	676.16	Fixed		in 2015
436	18872	MAC ARTHUR BLVD	750,231	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	522	975.30	1,035.32	10,330.68	Fixed		
436	18872	MAC ARTHUR BLVD	15,000	SF	Discretionary Approval	123	Manufacturing	PA36	5.1	IBC Multi-Use	522	6.75	6.30	69.30	Fixed		

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
437	2222	MARTIN	27,969	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	530	36.36	38.60	385.13	Redev	Res Potential	
438	2243	MARTIN	82	DU	Existing	102	Condominiums	PA36	5.3	IBC Residential	526	41.00	42.64	516.60	Fixed		in 2015
438	2253	MARTIN	82	DU	Existing	102	Condominiums	PA36	5.3	IBC Residential	526	41.00	42.64	516.60	Fixed		in 2015
438	2233	MARTIN	97	DU	Existing	102	Condominiums	PA36	5.3	IBC Residential	526	48.50	50.44	611.10	Fixed		in 2015
439	2302	MARTIN	60,131	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	534	78.17	82.98	828.00	Redev	Res Potential	
440	2405	MCCABE WAY	32,219	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	496	41.88	44.46	443.66	Redev	Res Potential	
441	2445	MCCABE WAY	54,392	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	496	70.71	75.06	748.98	Redev	Res Potential	
442	2485	MCCABE WAY	21,653	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	496	28.15	29.88	298.16	Redev	Res Potential	
443	2505	MCCABE WAY	19,225	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	499	24.99	26.53	264.73	Redev	Res Potential	Assume 2-acre park site in this TAZ
444	2515	MCCABE WAY	29,030	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	499	37.74	40.06	399.74	Redev	Res Potential	Assume 2-acre park site in this TAZ
445	2569	MCCABE WAY	369	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	499	0.48	0.51	5.08	Redev	Res Potential	Assume 2-acre park site in this TAZ
445	2569	MCCABE WAY	23,480	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	499	30.52	32.40	323.32	Redev	Res Potential	Assume 2-acre park site in this TAZ
446	2575	MCCABE WAY	23,381	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	499	30.40	32.27	321.96	Redev	Res Potential	Assume 2-acre park site in this TAZ
447	2900	MCCABE WAY	4,018	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	499	5.22	5.54	55.33	Redev	Res Potential	Assume 2-acre park site in this TAZ
447	2900	MCCABE WAY	17,019	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	499	22.12	23.49	234.35	Redev	Res Potential	Assume 2-acre park site in this TAZ
447	2900	MCCABE WAY	76,044	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	499	34.22	31.94	351.32	Redev	Res Potential	Assume 2-acre park site in this TAZ
448	18181	MCDURMOTT	2,608	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	452	6.62	18.15	219.07	Fixed		in 2015
448	18181	MCDURMOTT	4,467	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	452	5.81	6.16	61.51	Fixed		in 2015
448	18201	MCDURMOTT	7,495	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	452	9.74	10.34	103.21	Fixed		in 2015
448	18201	MCDURMOTT	5,357	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	452	2.41	2.25	24.75	Fixed		in 2015
448	18181	MCDURMOTT	5,734	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	452	2.58	2.41	26.49	Fixed		in 2015
449	18231	MCDURMOTT	46,250	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	452	60.13	63.83	636.86	Fixed		in 2015
450	18241	MCDURMOTT	1,950	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	452	4.95	13.57	163.80	Fixed		in 2015
450	18241	MCDURMOTT	46,249	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	452	60.12	63.82	636.85	Fixed		in 2015
451	1062	MCGAW AVE	8,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	400	10.40	11.04	110.16	Fixed		in 2015
451	1062	MCGAW AVE	16,753	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	400	21.78	23.12	230.69	Fixed		
451	1062	MCGAW AVE	99,600	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	400	44.82	41.83	460.15	Fixed		in 2015
452	1063	MCGAW AVE	55,640	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	396	72.33	76.78	766.16	Fixed		in 2015
453	1212	MCGAW AVE	1,415	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	400	1.84	1.95	19.48	Fixed		in 2015
453	1202	MCGAW AVE	2,101	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	400	2.73	2.90	28.93	Fixed		
453	1202	MCGAW AVE	4,229	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	400	5.50	5.84	58.23	Fixed		in 2015
453	1212	MCGAW AVE	13,585	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	400	6.11	5.71	62.76	Fixed		in 2015
453	1202	MCGAW AVE	25,771	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	400	11.60	10.82	119.06	Fixed		in 2015
454	1211	MCGAW AVE	4,800	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	396	6.24	6.62	66.10	Fixed		in 2015
454	1211	MCGAW AVE	6,503	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	396	8.45	8.97	89.55	Fixed		
454	1211	MCGAW AVE	33,236	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	396	14.96	13.96	153.55	Fixed		in 2015
455	1372	MCGAW AVE	2,969	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	408	3.86	4.10	40.88	Fixed		in 2015
455	1392	MCGAW AVE	5,360	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	408	6.97	7.40	73.81	Fixed		
455	1372	MCGAW AVE	5,515	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	408	7.17	7.61	75.94	Fixed		
455	1392	MCGAW AVE	12,860	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	408	5.79	5.40	59.41	Fixed		in 2015
455	1372	MCGAW AVE	16,831	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	408	7.57	7.07	77.76	Fixed		in 2015
456	1402	MCGAW AVE	3,700	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	413	4.81	5.11	50.95	Fixed		
456	1402	MCGAW AVE	5,412	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	413	7.04	7.47	74.52	Fixed		in 2015
456	1402	MCGAW AVE	19,813	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	413	8.92	8.32	91.54	Fixed		in 2015
457	1444	MCGAW AVE	22,239	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	413	28.91	30.69	306.23	Fixed		in 2015
457	1444	MCGAW AVE	56,522	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	413	73.48	78.00	778.31	Fixed		
457	1444	MCGAW AVE	33,696	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	413	15.16	14.15	155.68	Fixed		in 2015
457	1424	MCGAW AVE	32,640	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	413	14.69	13.71	150.80	Fixed		in 2015
457	1444	MCGAW AVE	70,193	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	413	31.59	29.48	324.29	Fixed		in 2015
458	1555	MCGAW AVE	5,554	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	415	7.22	7.66	76.48	Fixed		in 2015
458	1555	MCGAW AVE	12,959	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	415	5.83	5.44	59.87	Fixed		in 2015
459	1641	MCGAW AVE	10,496	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	424	13.64	14.48	144.53	Fixed		in 2015
459	1641	MCGAW AVE	3,424	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	424	1.54	1.44	15.82	Fixed		in 2015
460	1642	MCGAW AVE	5,556	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	428	7.22	7.67	76.51	Fixed		
460	1642	MCGAW AVE	12,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	428	5.40	5.04	55.44	Fixed		in 2015
461	1672	MCGAW AVE	2,309	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	428	3.00	3.19	31.79	Fixed		
461	1672	MCGAW AVE	2,712	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	428	3.53	3.74	37.34	Fixed		in 2015
461	1672	MCGAW AVE	8,844	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	428	3.98	3.71	40.86	Fixed		in 2015
462	1681	MCGAW AVE	244	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	424	0.32	0.34	3.36	Fixed		
462	1681	MCGAW AVE	3,912	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	424	5.09	5.40	53.87	Fixed		in 2015
462	1681	MCGAW AVE	10,908	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	424	4.91	4.58	50.39	Fixed		in 2015
463	1702	MCGAW AVE	27	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	428	0.04	0.04	0.37	Fixed		
463	1702	MCGAW AVE	4,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	428	5.85	6.21	61.97	Fixed		in 2015
463	1702	MCGAW AVE	11,356	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	428	5.11	4.77	52.46	Fixed		in 2015
464	1711	MCGAW AVE	3,225	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	424	4.19	4.45	44.41	Fixed		in 2015
464	1711	MCGAW AVE	12,403	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	424	5.58	5.21	57.30	Fixed		in 2015
465	1732	MCGAW AVE	4,054	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	428	5.27	5.59	55.82	Fixed		
465	1732	MCGAW AVE	13,800	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	428	6.21	5.80	63.76	Fixed		in 2015
466	1751	MCGAW AVE	2,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	424	3.25	3.45	34.43	Fixed		in 2015
466	1751	MCGAW AVE	2,929	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	424	3.81	4.04	40.33	Fixed		
466	1751	MCGAW AVE	9,200	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	424	4.14	3.86	42.50	Fixed		in 2015
467	1762	MCGAW AVE	1,407	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	428	1.83	1.94	19.37	Fixed		
467	1762	MCGAW AVE	10,370	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	428	13.48	14.31	142.79	Fixed		in 2015
467	1762	MCGAW AVE	13,612	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	428	6.13	5.72	62.89	Fixed		in 2015
468	1781	MCGAW AVE	6,150	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	424	8.00	8.49	84.69	Fixed		in 2015
468	1781	MCGAW AVE	10,618	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	424	4.78	4.46	49.06	Fixed		in 2015
469	1820	MCGAW AVE	3,382	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	428	4.40	4.67	46.57	Fixed		
469	1820	MCGAW AVE	14,600	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	428	6.57	6.13	67.45	Fixed		in 2015
470	1821	MCGAW AVE	1,449	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	424	1.88	2.00	19.95	Fixed		
470	1821	MCGAW AVE	3,771	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	424	4.90	5.20	51.93	Fixed		in 2015
470	1821	MCGAW AVE	9,429	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	424	4.24	3.96	43.56	Fixed		in 2015
471	1851	MCGAW AVE	244	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	424	0.32	0.34	3.36	Fixed		
471	1851	MCGAW AVE	3,600	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	424	4.68	4.97	49.57	Fixed		in 2015

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
471	1851	MCGAW AVE	13,425	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	424	6.04	5.64	62.02	Fixed		in 2015
472	1852	MCGAW AVE	1,902	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	428	4.83	13.24	159.77	Fixed		in 2015
472	1852	MCGAW AVE	1,902	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	428	2.47	2.62	26.19	Fixed		in 2015
472	1852	MCGAW AVE	2,931	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	428	3.81	4.04	40.36	Fixed		
472	1852	MCGAW AVE	8,642	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	428	3.89	3.63	39.93	Fixed		in 2015
473	1881	MCGAW AVE	674	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	424	0.88	0.93	9.28	Fixed		
473	1881	MCGAW AVE	6,292	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	424	8.18	8.68	86.64	Fixed		in 2015
473	1881	MCGAW AVE	8,763	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	424	3.94	3.68	40.49	Fixed		in 2015
474	1882	MCGAW AVE	1,935	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	428	2.52	2.67	26.64	Fixed		in 2015
474	1882	MCGAW AVE	3,446	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	428	4.48	4.76	47.45	Fixed		
474	1882	MCGAW AVE	15,565	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	428	7.00	6.54	71.91	Fixed		in 2015
475	1902	MCGAW AVE	5,263	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	444	6.84	7.26	72.47	Fixed		in 2015
475	1902	MCGAW AVE	6,942	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	444	9.02	9.58	95.59	Fixed		
475	1902	MCGAW AVE	26,561	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	444	11.95	11.16	122.71	Fixed		in 2015
476	17836	GILLETTE AVE	0	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	462	0.00	0.00	0.00	Fixed		in 2015
476	17861	VON KARMAN AVE	0	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	462	0.00	0.00	0.00	Fixed		in 2015
476	17861	VON KARMAN AVE	0	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	462	0.00	0.00	0.00	Fixed		in 2015
476	17871	VON KARMAN AVE	4,726	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	462	6.14	6.52	65.08	Fixed		in 2015
476	17551	VON KARMAN AVE	6,460	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	462	8.40	8.91	88.95	Fixed		in 2015
476	17571	VON KARMAN AVE	6,466	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	462	8.41	8.92	89.04	Fixed		in 2015
476	17501	VON KARMAN AVE	7,296	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	462	9.48	10.07	100.47	Fixed		in 2015
476	17836	GILLETTE AVE	12,083	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	462	15.71	16.67	166.38	Fixed		in 2015
476	17571	VON KARMAN AVE	32,665	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	462	42.46	45.08	449.80	Fixed		in 2015
476	17871	VON KARMAN AVE	34,615	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	462	45.00	47.77	476.65	Fixed		in 2015
476	17861	VON KARMAN AVE	44,100	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	462	57.33	60.86	607.26	Fixed		in 2015
476	17871	VON KARMAN AVE	173,774	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	462	225.91	239.81	2,392.87	Fixed		in 2015
476	17571	VON KARMAN AVE	13,622	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	462	6.13	5.72	62.93	Fixed		in 2015
476	17551	VON KARMAN AVE	14,224	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	462	6.40	5.97	65.71	Fixed		in 2015
476	17501	VON KARMAN AVE	18,576	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	462	8.36	7.80	85.82	Fixed		in 2015
476	17836	GILLETTE AVE	98,247	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	462	44.21	41.26	453.90	Fixed		in 2015
476	17871	VON KARMAN AVE	196,300	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	462	88.34	82.45	906.91	Fixed		in 2015
476	17838	GILLETTE AVE	2,053	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	478	2.67	2.83	28.27	Fixed		in 2015
476	17838	GILLETTE AVE	55,921	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	478	72.70	77.17	770.03	Fixed		in 2015
477	2010	MCGAW AVE	6,927	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	449	9.01	9.56	95.38	Redev	Non-Res Optimization	
477	2004	MCGAW AVE	6,960	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	449	9.05	9.60	95.84	Redev	Non-Res Optimization	
477	2006	MCGAW AVE	7,976	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	449	10.37	11.01	109.83	Redev	Non-Res Optimization	
477	2026	MCGAW AVE	12,311	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	449	16.00	16.99	169.52	Redev	Non-Res Optimization	
477	2008	MCGAW AVE	17,780	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	449	23.11	24.54	244.83	Redev	Non-Res Optimization	
477	2026	MCGAW AVE	20,454	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	449	26.59	28.23	281.65	Redev	Non-Res Optimization	
477	2010	MCGAW AVE	23,146	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	449	30.09	31.94	318.72	Redev	Non-Res Optimization	
477	2008	MCGAW AVE	17,125	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	449	7.71	7.19	79.12	Redev	Non-Res Optimization	
477	2004	MCGAW AVE	21,970	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	449	9.89	9.23	101.50	Redev	Non-Res Optimization	
477	2010	MCGAW AVE	36,105	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	449	16.25	15.16	166.81	Redev	Non-Res Optimization	
477	2006	MCGAW AVE	37,024	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	449	16.66	15.55	171.05	Redev	Non-Res Optimization	
477	2026	MCGAW AVE	84,666	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	449	38.10	35.56	391.16	Redev	Non-Res Optimization	
478	2111	MCGAW AVE	19,602	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	442	25.48	27.05	269.92	Redev	Non-Res Optimization	
478	2111	MCGAW AVE	43,681	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	442	56.79	60.28	601.49	Redev	Non-Res Optimization	
478	2111	MCGAW AVE	92,070	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	442	41.43	38.67	425.36	Redev	Non-Res Optimization	
479	2150	MCGAW AVE	44,189	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	458	57.45	60.98	608.48	Fixed		in 2015
479	2150	MCGAW AVE	64,493	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	458	83.84	89.00	888.07	Fixed		
479	2150	MCGAW AVE	50,841	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	458	22.88	21.35	234.89	Fixed		in 2015
480	17332	VON KARMAN AVE	0	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	463	0.00	0.00	0.00	Redev	Non-Res Optimization	
480	17333	VON KARMAN AVE	26,824	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	463	34.87	37.02	369.37	Redev	Non-Res Optimization	
480	17334	VON KARMAN AVE	2,900	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	463	1.31	1.22	13.40	Redev	Non-Res Optimization	
481	2332	MCGAW AVE	14,631	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	463	19.02	20.19	201.47	Redev	Non-Res Optimization	
481	2332	MCGAW AVE	24,396	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	463	10.98	10.25	112.71	Redev	Non-Res Optimization	
482	2361	MCGAW AVE	10,960	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	455	14.25	15.12	150.92	Redev	Non-Res Optimization	
482	2361	MCGAW AVE	12,017	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	455	15.62	16.58	165.47	Redev	Non-Res Optimization	
482	2351	MCGAW AVE	15,347	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	455	19.95	21.18	211.33	Redev	Non-Res Optimization	
482	2361	MCGAW AVE	15,854	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	455	7.13	6.66	73.25	Redev	Non-Res Optimization	
483	2362	MCGAW AVE	1,216	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	463	1.58	1.68	16.74	Redev	Non-Res Optimization	
483	2362	MCGAW AVE	9,907	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	463	12.88	13.67	136.42	Redev	Non-Res Optimization	
483	2362	MCGAW AVE	13,385	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	463	6.02	5.62	61.84	Redev	Non-Res Optimization	
484	2424	MCGAW AVE	10,908	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	472	14.18	15.05	150.20	Redev	Non-Res Optimization	
484	2424	MCGAW AVE	39,232	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	472	17.65	16.48	181.25	Redev	Non-Res Optimization	
486	2552	MCGAW AVE	5,334	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	476	6.93	7.36	73.45	Redev	Non-Res Optimization	
486	2552	MCGAW AVE	5,830	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	476	7.58	8.05	80.28	Redev	Non-Res Optimization	
486	2552	MCGAW AVE	29,970	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	476	13.49	12.59	138.46	Redev	Non-Res Optimization	
487	2602	MCGAW AVE	7,932	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	476	10.31	10.95	109.22	Redev	Non-Res Optimization	
487	2602	MCGAW AVE	19,652	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	476	25.55	27.12	270.61	Redev	Non-Res Optimization	
487	2602	MCGAW AVE	16,498	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	476	7.42	6.93	76.22	Redev	Non-Res Optimization	
488	2652	MCGAW AVE	26,549	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	476	34.51	36.64	365.58	Redev	Non-Res Optimization	
488	2652	MCGAW AVE	14,651	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	476	6.59	6.15	67.69	Redev	Non-Res Optimization	
489	2712	MCGAW AVE	3,920	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	476	5.10	5.41	53.98	Redev	Non-Res Optimization	
489	2712	MCGAW AVE	9,089	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	476	11.82	12.54	125.16	Redev	Non-Res Optimization	
489	2712	MCGAW AVE	28,686	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	476	12.91	12.05	132.53	Redev	Non-Res Optimization	
490	2805	MCGAW AVE	6,100	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	7.93	8.42	84.00	Redev	Res Potential	
490	2815	MCGAW AVE	7,928	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	10.31	10.94	109.17	Redev	Res Potential	
490	2823	MCGAW AVE	10,462	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	13.60	14.44	144.06	Redev	Res Potential	
490	2811	MCGAW AVE	10,486	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	13.63	14.47	144.39	Redev	Res Potential	
490	2801	MCGAW AVE	17,103	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	474	22.23	23.60	235.51	Redev	Res Potential	
490	2801	MCGAW AVE	20,046	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	26.06	27.66	276.03	Redev	Res Potential	
490	2823	MCGAW AVE	1,996	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	474	0.90	0.84	9.22	Redev	Res Potential	

IBC Vision Plan Database Snap Shot As Of July 10, 2009

Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
490	2815	MCGAW AVE	6,492	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	474	2.92	2.73	29.99	Redev	Res Potential	
490	2801	MCGAW AVE	8,196	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	474	3.69	3.44	37.87	Redev	Res Potential	
490	2811	MCGAW AVE	9,720	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	474	4.37	4.08	44.91	Redev	Res Potential	
490	2805	MCGAW AVE	14,124	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	474	6.36	5.93	65.25	Redev	Res Potential	
491	2852	MCGAW AVE	10,202	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	485	13.26	14.08	140.48	Redev	Res Potential	
491	2852	MCGAW AVE	12,164	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	485	5.47	5.11	56.20	Redev	Res Potential	
492	2082	MICHELSON DR	40,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	512	52.00	55.20	550.80	Fixed		in 2015
493	2132	MICHELSON DR	94,006	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	513	122.21	129.73	1,294.46	Fixed		in 2015
493	2132	MICHELSON DR	1,600	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	513	0.72	0.67	7.39	Fixed		in 2015
494	2151	MICHELSON DR	93,840	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	507	121.99	129.50	1,292.18	Fixed		in 2015
495	2222	MICHELSON DR	23,595	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	514	59.93	164.22	1,981.98	Fixed		in 2015
496	2272	MICHELSON DR	9,065	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	514	23.03	63.09	761.46	Fixed		in 2015
497	2300	MICHELSON DR	24,100	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	514	31.33	33.26	331.86	Fixed		in 2015
497	2300	MICHELSON DR	55,000	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	514	71.50	75.90	757.35	Fixed		
498	2400	MICHELSON DR	12,986	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	518	16.88	17.92	178.82	Fixed		
498	2400	MICHELSON DR	17,508	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	518	22.76	24.16	241.09	Fixed		in 2015
498	2402	MICHELSON DR	41,810	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	518	54.35	57.70	575.72	Fixed		in 2015
499	2500	MICHELSON DR	2,181	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	518	2.84	3.01	30.03	Fixed		
499	2500	MICHELSON DR	51,854	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	518	67.41	71.56	714.03	Fixed		in 2015
500	18581	TELLER AVE	86,745	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	524	112.77	119.71	1,194.48	Fixed		in 2015
500	2600	MICHELSON DR	326,650	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	524	424.65	450.78	4,497.97	Fixed		in 2015
501	2722	MICHELSON DR	7,750	SF	Discretionary Approval	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	528	19.69	53.94	651.00	Fixed		in 2015
501	2722	MICHELSON DR	-314,712	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	528	-409.13	-434.30	-4,333.58	Fixed		
501	2722	MICHELSON DR	-71,045	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	528	-92.36	-98.04	-978.29	Fixed		
501	2722	MICHELSON DR	-25,828	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	528	-33.58	-35.64	-355.65	Fixed		
501	2722	MICHELSON DR	25,828	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	528	33.58	35.64	355.65	Fixed		in 2015
501	2722	MICHELSON DR	71,045	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	528	92.36	98.04	978.29	Fixed		
501	2722	MICHELSON DR	314,712	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	528	409.13	434.30	4,333.58	Fixed		
501	2722	MICHELSON DR	495,000	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	528	643.50	683.10	6,816.15	Fixed		in 2015
501	2722	MICHELSON DR	-143,727	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	528	-64.68	-60.37	-664.02	Fixed		
501	2722	MICHELSON DR	-25,260	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	528	-11.37	-10.61	-116.70	Fixed		
501	2722	MICHELSON DR	25,260	SF	Discretionary Approval	123	Manufacturing	PA36	5.1	IBC Multi-Use	528	11.37	10.61	116.70	Fixed		
501	2722	MICHELSON DR	143,727	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	528	64.68	60.37	664.02	Fixed		in 2015
503	3333	MICHELSON DR	187,500	SF	Discretionary Approval	11	Hotel	PA36	5.1	IBC Multi-Use	516	0.00	0.00	0.00	Fixed		
503	3131	MICHELSON DR	114	DU	Density Bonus/Existing	102	Condominiums	PA36	5.1	IBC Multi-Use	516	57.00	59.28	718.20	Fixed		in 2015
503	3141	MICHELSON DR	118	DU	Density Bonus/Existing	102	Condominiums	PA36	5.1	IBC Multi-Use	516	59.00	61.36	743.40	Fixed		in 2015
503	2981	MICHELSON DR	0	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	516	0.00	0.00	0.00	Fixed		in 2015
503	2983	MICHELSON DR	0	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	516	0.00	0.00	0.00	Fixed		in 2015
503	3041	MICHELSON DR	0	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	516	0.00	0.00	0.00	Fixed		in 2015
503	2957	MICHELSON DR	5,200	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	516	13.21	36.19	436.80	Fixed		in 2015
503	3309	MICHELSON DR	5,521	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	516	14.02	38.43	463.76	Fixed		in 2015
503	2961	MICHELSON DR	6,953	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	516	17.66	48.39	584.05	Fixed		in 2015
503	2991	MICHELSON DR	7,026	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	516	17.85	48.90	590.18	Fixed		in 2015
503	3021/3041	MICHELSON DR	18,800	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	516	47.75	130.85	1,579.20	Fixed		in 2015
503	3333	MICHELSON DR	50,000	SF	Discretionary Approval	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	516	127.00	348.00	4,200.00	Fixed		in 2015
503	2963/2981	MICHELSON DR	83,919	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	516	213.15	584.08	7,049.20	Fixed		in 2015
503	3333	MICHELSON DR	154	ROOM	Discretionary Approval	111	HOTEL - ITAM	PA36	5.1	IBC Multi-Use	516	64.68	104.72	1,540.00	Fixed		
503	3333	MICHELSON DR	7,461	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	516	9.70	10.30	102.74	Fixed		Childcare
503	3121	MICHELSON DR	154,856	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	516	201.31	213.70	2,132.37	Fixed		in 2015
503	3333	MICHELSON DR	273,215	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	516	355.18	377.04	3,762.17	Fixed		in 2015
503	3333	MICHELSON DR	459,200	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	516	596.96	633.70	6,323.18	Fixed		
503	3161	MICHELSON DR	538,153	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	516	699.60	742.65	7,410.37	Fixed		in 2015
503	3333	MICHELSON DR	0	SF	Discretionary Approval	123	Manufacturing	PA36	5.1	IBC Multi-Use	516	0.00	0.00	0.00	Fixed		
503	3333	MICHELSON DR	187,500	SF	Discretionary Approval	11	Hotel	PA36	5.1	IBC Multi-Use	523	0.00	0.00	0.00	Fixed		
503	3337	MICHELSON DR	128	DU	Density Bonus/Discretionary Approval	102	Condominiums	PA36	5.1	IBC Multi-Use	523	64.00	66.56	806.40	Fixed		in 2015
503	3337	MICHELSON DR	776	DU	Discretionary Approval	102	Condominiums	PA36	5.1	IBC Multi-Use	523	388.00	403.52	4,888.80	Fixed		
503	3337	MICHELSON DR	872	DU	Discretionary Approval	102	Condominiums	PA36	5.1	IBC Multi-Use	523	436.00	453.44	5,493.60	Fixed		in 2015
503	3333	MICHELSON DR	25,000	SF	Discretionary Approval	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	523	63.50	174.00	2,100.00	Fixed		in 2015
503	3333	MICHELSON DR	147,581	SF	Discretionary Approval	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	523	374.86	1,027.16	12,396.80	Fixed		
503	3333	MICHELSON DR	154	ROOM	Discretionary Approval	111	HOTEL - ITAM	PA36	5.1	IBC Multi-Use	523	64.68	104.72	1,540.00	Fixed		
503	3333	MICHELSON DR	245,000	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	523	318.50	338.10	3,373.65	Fixed		in 2015
503	3333	MICHELSON DR	336,889	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	523	437.96	464.91	4,638.96	Fixed		
503	3333	MICHELSON DR	1,682,996	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	523	2,187.89	2,322.53	23,174.85	Fixed		in 2015
504	3301	MICHELSON DR	0	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	516	0.00	0.00	0.00	Fixed		in 2015
505	16541	MILLIKAN	5,558	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	420	7.23	7.67	76.53	Redev	Res Potential	
505	16541	MILLIKAN	8,264	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	420	10.74	11.40	113.80	Redev	Res Potential	
505	16541	MILLIKAN	33,168	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	420	14.93	13.93	153.24	Redev	Res Potential	
506	16542	MILLIKAN	855	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	431	1.11	1.18	11.77	Redev	Res Potential	
506	16542	MILLIKAN	20,943	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	431	27.23	28.90	288.39	Redev	Res Potential	
506	16542	MILLIKAN	37,907	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	431	17.06	15.92	175.13	Redev	Res Potential	
507	16591	MILLIKAN	632	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	420	0.82	0.87	8.70	Redev	Res Potential	
507	16591	MILLIKAN	3,675	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	420	4.78	5.07	50.60	Redev	Res Potential	
507	16591	MILLIKAN	11,025	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	420	4.96	4.63	50.94	Redev	Res Potential	
508	16592	MILLIKAN	4,021	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	431	5.23	5.55	55.37	Fixed		
508	16592	MILLIKAN	12,075	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	431	5.43	5.07	55.79	Fixed		in 2015
509	16631	MILLIKAN	654	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	420	0.85	0.90	9.01	Redev	Res Potential	
509	16631	MILLIKAN	3,432	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	420	4.46	4.74	47.26	Redev	Res Potential	
509	16631	MILLIKAN	12,042	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	420	5.42	5.06	55.63	Redev	Res Potential	
510	16632	MILLIKAN	8,566	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	431	11.14	11.82	117.95	Redev	Res Potential	
510	16632	MILLIKAN	5,324	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	431	2.40	2.24	24.60	Redev	Res Potential	
511	16661	MILLIKAN	507	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	420	0.66	0.70	6.98	Fixed		
511	16661	MILLIKAN	4,130	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	420	5.37	5.70	56.87	Fixed		in 2015
511	16661	MILLIKAN	14,323	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	420	6.45	6.02	66.17	Fixed		in 2015

IBC Vision Plan Database Snap Shot As Of July 10, 2009

Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
512	16662	MILLIKAN	1,358	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	431	1.77	1.87	18.70	Fixed		
512	16662	MILLIKAN	5,100	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	431	6.63	7.04	70.23	Fixed		in 2015
512	16662	MILLIKAN	5,100	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	431	2.30	2.14	23.56	Fixed		in 2015
513	16682	MILLIKAN	4,703	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	431	6.11	6.49	64.76	Redev	Res Potential	
513	16682	MILLIKAN	11,825	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	431	5.32	4.97	54.63	Redev	Res Potential	
514	16691	MILLIKAN	1,330	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	420	1.73	1.84	18.31	Redev	Res Potential	
514	16691	MILLIKAN	2,143	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	420	2.79	2.96	29.51	Redev	Res Potential	
514	16691	MILLIKAN	13,216	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	420	5.95	5.55	61.06	Redev	Res Potential	
515	16721	MILLIKAN	6,078	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	420	7.90	8.39	83.69	Redev	Res Potential	
515	16721	MILLIKAN	8,420	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	420	3.79	3.54	38.90	Redev	Res Potential	
516	16722	MILLIKAN	4,043	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	431	5.26	5.58	55.67	Redev	Res Potential	
516	16722	MILLIKAN	12,100	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	431	5.45	5.08	55.90	Redev	Res Potential	
517	16751	MILLIKAN	6,292	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	438	8.18	8.68	86.64	Redev	Res Potential	
517	16751	MILLIKAN	8,454	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	3.80	3.55	39.06	Redev	Res Potential	
518	16752	MILLIKAN	676	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	446	0.88	0.93	9.31	Redev	Res Potential	
518	16752	MILLIKAN	3,825	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	446	4.97	5.28	52.67	Redev	Res Potential	
518	16752	MILLIKAN	11,475	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	5.16	4.82	53.01	Redev	Res Potential	
519	16781	MILLIKAN	4,096	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	438	5.32	5.65	56.40	Redev	Res Potential	
519	16781	MILLIKAN	13,662	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	6.15	5.74	63.12	Redev	Res Potential	
520	16782	MILLIKAN	4,032	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	446	5.24	5.56	55.52	Redev	Res Potential	
520	16782	MILLIKAN	12,450	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	5.60	5.23	57.52	Redev	Res Potential	
521	16811	MILLIKAN	6,977	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	438	9.07	9.63	96.07	Redev	Res Potential	
521	16811	MILLIKAN	8,030	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	3.61	3.37	37.10	Redev	Res Potential	
522	16812	MILLIKAN	4,032	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	446	5.24	5.56	55.52	Redev	Res Potential	
522	16812	MILLIKAN	12,450	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	5.60	5.23	57.52	Redev	Res Potential	
523	16841	MILLIKAN	4,010	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	438	5.21	5.53	55.22	Redev	Res Potential	
523	16841	MILLIKAN	13,918	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	6.26	5.85	64.30	Redev	Res Potential	
524	16842	MILLIKAN	1,052	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	446	1.37	1.45	14.49	Redev	Res Potential	
524	16842	MILLIKAN	2,750	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	446	3.58	3.80	37.87	Redev	Res Potential	
524	16842	MILLIKAN	13,345	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	6.01	5.60	61.65	Redev	Res Potential	
525	16871	MILLIKAN	3,339	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	438	4.34	4.61	45.98	Redev	Res Potential	
525	16871	MILLIKAN	15,875	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	7.14	6.67	73.34	Redev	Res Potential	
526	16872	MILLIKAN	3,361	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	446	4.37	4.64	46.28	Redev	Res Potential	
526	16872	MILLIKAN	15,525	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	6.99	6.52	71.73	Redev	Res Potential	
527	16901	MILLIKAN	1,210	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	438	1.57	1.67	16.66	Redev	Res Potential	
527	16901	MILLIKAN	3,630	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	438	4.72	5.01	49.99	Redev	Res Potential	
527	16901	MILLIKAN	10,280	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	4.63	4.32	47.49	Redev	Res Potential	
528	16902	MILLIKAN	3,966	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	446	5.16	5.47	54.61	Redev	Res Potential	
528	16902	MILLIKAN	13,600	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	6.12	5.71	62.83	Redev	Res Potential	
529	16931	MILLIKAN	7,971	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	438	10.36	11.00	109.76	Redev	Res Potential	
529	16931	MILLIKAN	14,863	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	438	19.32	20.51	204.66	Redev	Res Potential	
529	16931	MILLIKAN	4,073	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	438	1.83	1.71	18.82	Redev	Res Potential	
530	16952	MILLIKAN	30	DU	Density Bonus/Pending Approval	102	Condominiums	PA36	5.1	IBC Multi-Use	446	15.00	15.60	189.00	Fixed		in 2015
530	16952	MILLIKAN	126	DU	Pending Approval	102	Condominiums	PA36	5.1	IBC Multi-Use	446	63.00	65.52	793.80	Fixed		in 2015
530	16952	MILLIKAN	-15,922	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	446	-20.70	-21.97	-219.25	Fixed		
530	16952	MILLIKAN	-4,084	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	446	-5.31	-5.64	-56.24	Fixed		
530	16952	MILLIKAN	4,084	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	446	5.31	5.64	56.24	Fixed		
530	16952	MILLIKAN	15,922	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	446	20.70	21.97	219.25	Fixed		in 2015
530	16952	MILLIKAN	-24,566	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	-11.05	-10.32	-113.49	Fixed		
530	16952	MILLIKAN	24,566	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	11.05	10.32	113.49	Fixed		in 2015
531	17681	MITCHELL	10,179	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	426	13.23	14.05	140.16	Fixed		
531	17681	MITCHELL	20,217	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	26.28	27.90	278.39	Fixed		in 2015
531	17681	MITCHELL	16,633	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	426	7.48	6.99	76.84	Fixed		in 2015
532	17682	MITCHELL	15,590	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	436	20.27	21.51	214.67	Fixed		in 2015
533	17691	MITCHELL	5,620	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	7.31	7.76	77.39	Fixed		in 2015
533	17691	MITCHELL	11,320	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	426	5.09	4.75	52.30	Fixed		in 2015
534	17701	MITCHELL	12,368	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	16.08	17.07	170.31	Fixed		in 2015
535	17702	MITCHELL	13,197	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	436	17.16	18.21	181.72	Fixed		in 2015
535	17702	MITCHELL	3,300	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	436	1.49	1.39	15.25	Fixed		in 2015
536	17711	MITCHELL	840	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	426	1.09	1.16	11.57	Fixed		
536	17711	MITCHELL	5,595	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	426	7.27	7.72	77.04	Fixed		in 2015
536	17711	MITCHELL	5,060	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	426	2.28	2.13	23.38	Fixed		in 2015
537	17712	MITCHELL	13,088	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	436	17.01	18.06	180.22	Fixed		in 2015
538	17721	MITCHELL	901	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	414	1.17	1.24	12.41	Fixed		
538	17721	MITCHELL	3,538	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	4.60	4.88	48.72	Fixed		in 2015
538	17721	MITCHELL	11,280	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	414	5.08	4.74	52.11	Fixed		in 2015
539	17731	MITCHELL	2,831	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	414	3.68	3.91	38.98	Fixed		
539	17731	MITCHELL	15,260	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	19.84	21.06	210.13	Fixed		in 2015
539	17731	MITCHELL	3,280	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	414	1.48	1.38	15.15	Fixed		in 2015
540	17741	MITCHELL	4,993	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	6.49	6.89	68.75	Fixed		in 2015
540	17741	MITCHELL	12,948	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	414	5.83	5.44	59.82	Fixed		in 2015
541	17742	MITCHELL	8,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	436	10.40	11.04	110.16	Fixed		in 2015
541	17742	MITCHELL	8,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	436	3.60	3.36	36.96	Fixed		in 2015
542	17751	MITCHELL	8,686	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	414	11.29	11.99	119.61	Fixed		
542	17751	MITCHELL	18,916	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	414	8.51	7.94	87.39	Fixed		in 2015
543	17752	MITCHELL	17,804	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	436	23.15	24.57	245.16	Fixed		in 2015
544	17761	MITCHELL	6,389	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	8.31	8.82	87.98	Fixed		in 2015
544	17761	MITCHELL	6,388	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	414	2.87	2.68	29.51	Fixed		in 2015
545	17762	MITCHELL	5,557	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	436	7.22	7.67	76.52	Fixed		in 2015
545	17762	MITCHELL	9,362	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	436	12.17	12.92	128.91	Fixed		
545	17762	MITCHELL	8,012	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	436	3.61	3.37	37.02	Fixed		in 2015
546	17771	MITCHELL	1,042	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	414	1.35	1.44	14.35	Fixed		
546	17771	MITCHELL	8,903	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	11.57	12.29	122.59	Fixed		in 2015

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
546	17771	MITCHELL	1,750	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	414	0.79	0.74	8.09	Fixed		in 2015
547	17781	MITCHELL	10,120	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	13.16	13.97	139.35	Fixed		in 2015
547	17781	MITCHELL	9,892	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	414	4.45	4.15	45.70	Fixed		in 2015
548	17802	MITCHELL	1,116	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	436	1.45	1.54	15.37	Fixed		
548	17802	MITCHELL	6,382	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	436	8.30	8.81	87.88	Fixed		in 2015
548	17802	MITCHELL	9,654	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	436	4.34	4.05	44.60	Fixed		in 2015
549	17811	MITCHELL	10,700	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	414	13.91	14.77	147.34	Fixed		in 2015
549	17811	MITCHELL	9,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	414	4.05	3.78	41.58	Fixed		in 2015
550	17841	MITCHELL	318	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	430	0.41	0.44	4.38	Fixed		
550	17841	MITCHELL	8,566	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	11.14	11.82	117.95	Fixed		in 2015
550	17841	MITCHELL	8,899	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	4.00	3.74	41.11	Fixed		in 2015
551	17842	MITCHELL	4,788	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	437	6.22	6.61	65.93	Fixed		in 2015
551	17842	MITCHELL	12,832	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	437	5.77	5.39	59.28	Fixed		in 2015
552	17871	MITCHELL	13,220	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	17.19	18.24	182.04	Fixed		in 2015
553	17872	MITCHELL	15,592	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	437	20.27	21.52	214.70	Fixed		in 2015
553	17872	MITCHELL	974	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	437	0.44	0.41	4.50	Fixed		in 2015
554	17911	MITCHELL	10,685	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	13.89	14.75	147.13	Fixed		in 2015
554	17911	MITCHELL	10,685	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	4.81	4.49	49.36	Fixed		in 2015
555	17912	MITCHELL	11,639	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	437	15.13	16.06	160.27	Fixed		in 2015
556	17941	MITCHELL	10,450	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	13.59	14.42	143.90	Fixed		in 2015
556	17941	MITCHELL	4,950	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	2.23	2.08	22.87	Fixed		in 2015
557	17991	MITCHELL	15,381	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	20.00	21.23	211.80	Fixed		in 2015
558	17992	MITCHELL	600	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	437	1.52	4.18	50.40	Fixed		in 2015
558	17992	MITCHELL	18,360	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	437	23.87	25.34	252.82	Fixed		in 2015
558	17992	MITCHELL	2,600	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	437	1.17	1.09	12.01	Fixed		in 2015
559	18001	MITCHELL	7,848	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	10.20	10.83	108.07	Fixed		in 2015
559	18001	MITCHELL	11,696	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	5.26	4.91	54.04	Fixed		in 2015
560	18011	MITCHELL	1,146	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	430	1.49	1.58	15.78	Fixed		
560	18011	MITCHELL	19,539	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	430	25.40	26.96	269.05	Fixed		in 2015
560	18011	MITCHELL	15,811	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	430	7.11	6.64	73.05	Fixed		in 2015
561	18012	MITCHELL	26,200	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	437	34.06	36.16	360.77	Fixed		in 2015
562	2362	MORSE AVE	8,080	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	496	10.50	11.15	111.26	Redev	Res Potential	
563	2372	MORSE AVE	333	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	496	0.43	0.46	4.59	Redev	Res Potential	
563	2372	MORSE AVE	10,188	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	496	13.24	14.06	140.29	Redev	Res Potential	
563	2372	MORSE AVE	1,061	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	496	0.48	0.45	4.90	Redev	Res Potential	
564	2375	MORSE AVE	13,928	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	496	18.11	19.22	191.79	Redev	Res Potential	
564	2375	MORSE AVE	11,783	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	496	5.30	4.95	54.44	Redev	Res Potential	
565	2381	MORSE AVE	30,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	496	39.00	41.40	413.10	Redev	Res Potential	
566	2382	MORSE AVE	3,411	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	496	4.43	4.71	46.97	Redev	Res Potential	
566	2382	MORSE AVE	5,667	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	496	7.37	7.82	78.03	Redev	Res Potential	
566	2382	MORSE AVE	17,747	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	496	7.99	7.45	81.99	Redev	Res Potential	
567	2392	MORSE AVE	20,042	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	496	26.05	27.66	275.98	Redev	Res Potential	
568	0	MURPHY AVE	12,741	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	489	16.56	17.58	175.44	Redev	Res Potential	Assume 2-acre park site in this TAZ
569	2852	ALTON PKWY	2,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	3.25	3.45	34.43	Redev	Res Potential	
569	2852	ALTON PKWY	10,990	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	474	14.29	15.17	151.33	Redev	Res Potential	
569	2852	ALTON PKWY	20,400	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	474	9.18	8.57	94.25	Redev	Res Potential	
570	17032	MURPHY AVE	1,919	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	474	2.49	2.65	26.42	Redev	Res Potential	
570	17032	MURPHY AVE	6,688	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	8.69	9.23	92.09	Redev	Res Potential	
570	17032	MURPHY AVE	14,176	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	474	6.38	5.95	65.49	Redev	Res Potential	
571	17041	MURPHY AVE	5,824	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	469	7.57	8.04	80.20	Redev	Res Potential	
571	17041	MURPHY AVE	10,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	469	13.65	14.49	144.59	Redev	Res Potential	
571	17041	MURPHY AVE	12,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	469	5.40	5.04	55.44	Redev	Res Potential	
572	17062	MURPHY AVE	1,391	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	474	1.81	1.92	19.15	Redev	Res Potential	
572	17062	MURPHY AVE	8,258	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	10.74	11.40	113.71	Redev	Res Potential	
572	17062	MURPHY AVE	11,133	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	474	5.01	4.68	51.43	Redev	Res Potential	
573	17071	MURPHY AVE	1,648	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	474	2.14	2.27	22.69	Redev	Res Potential	
573	17071	MURPHY AVE	5,522	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	7.18	7.62	76.04	Redev	Res Potential	
573	17071	MURPHY AVE	19,657	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	474	8.85	8.26	90.82	Redev	Res Potential	
574	17100	MURPHY AVE	6,529	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	474	8.49	9.01	89.90	Redev	Res Potential	
574	17100	MURPHY AVE	10,195	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	13.25	14.07	140.39	Redev	Res Potential	
574	17100	MURPHY AVE	26,013	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	474	11.71	10.93	120.18	Redev	Res Potential	
575	17101	MURPHY AVE	3,623	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	474	4.71	5.00	49.89	Redev	Res Potential	
575	17101	MURPHY AVE	4,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	5.20	5.52	55.08	Redev	Res Potential	
575	17101	MURPHY AVE	15,923	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	474	7.17	6.69	73.56	Redev	Res Potential	
576	17141	MURPHY AVE	10,840	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	14.09	14.96	149.27	Redev	Res Potential	
576	17141	MURPHY AVE	16,860	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	474	7.59	7.08	77.89	Redev	Res Potential	
577	17162	MURPHY AVE	6,701	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	474	8.71	9.25	92.27	Fixed		
577	17162	MURPHY AVE	20,250	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	474	9.11	8.51	93.56	fixed		in 2015
578	17171	MURPHY AVE	5,653	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	474	7.35	7.80	77.84	Redev	Res Potential	
578	17171	MURPHY AVE	23,636	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	474	10.64	9.93	109.20	Redev	Res Potential	
579	17192	MURPHY AVE	24,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	31.20	33.12	330.48	Fixed		in 2015
580	2851	MCGAW AVE	1,676	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	2.18	2.31	23.08	Redev	Res Potential	
580	17241	MURPHY AVE	2,680	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	3.48	3.70	36.90	Redev	Res Potential	
580	17241	MURPHY AVE	3,842	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	474	4.99	5.30	52.90	Redev	Res Potential	
580	17241	MURPHY AVE	1,890	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	474	0.85	0.79	8.73	Redev	Res Potential	
580	2851	MCGAW AVE	3,861	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	474	1.74	1.62	17.84	Redev	Res Potential	
580	17241	MURPHY AVE	9,643	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	474	4.34	4.05	44.55	Redev	Res Potential	
581	17272	MURPHY AVE	14,059	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	489	18.28	19.40	193.59	Redev	Res Potential	Assume 2-acre park site in this TAZ
582	17321	MURPHY AVE	8,755	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	485	11.38	12.08	120.56	Redev	Res Potential	
582	17321	MURPHY AVE	16,930	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	485	7.62	7.11	78.22	Redev	Res Potential	
583	17322	MURPHY AVE	10,229	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	489	13.30	14.12	140.85	Redev	Res Potential	Assume 2-acre park site in this TAZ
583	17322	MURPHY AVE	11,647	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	489	5.24	4.89	53.81	Redev	Res Potential	Assume 2-acre park site in this TAZ
584	17351	MURPHY AVE	4,463	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	485	5.80	6.16	61.46	Redev	Res Potential	

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
584	17351	MURPHY AVE	5,017	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	485	6.52	6.92	69.08	Redev	Res Potential	
584	17351	MURPHY AVE	11,580	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	485	5.21	4.86	53.50	Redev	Res Potential	
585	17352	MURPHY AVE	2,253	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	489	2.93	3.11	31.02	Redev	Res Potential	Assume 2-acre park site in this TAZ
585	17352	MURPHY AVE	6,178	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	489	8.03	8.53	85.07	Redev	Res Potential	Assume 2-acre park site in this TAZ
585	17352	MURPHY AVE	19,027	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	489	8.56	7.99	87.90	Redev	Res Potential	Assume 2-acre park site in this TAZ
586	17391	MURPHY AVE	2,425	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	485	3.15	3.35	33.39	Redev	Res Potential	
586	17391	MURPHY AVE	3,496	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	485	4.54	4.82	48.14	Redev	Res Potential	
586	17391	MURPHY AVE	22,613	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	485	10.18	9.50	104.47	Redev	Res Potential	
587	17392	MURPHY AVE	450	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	489	0.59	0.62	6.20	Redev	Res Potential	Assume 2-acre park site in this TAZ
587	17392	MURPHY AVE	11,507	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	489	14.96	15.88	158.45	Redev	Res Potential	Assume 2-acre park site in this TAZ
587	17392	MURPHY AVE	100,426	SF	Existing	161	Mini Warehouse	PA36	5.1	IBC Multi-Use	489	29.12	27.12	305.30	Redev	Res Potential	Assume 2-acre park site in this TAZ
588	2853	KELVIN AVE	71	DU	Existing	103	Apartments	PA36	5.3D	IBC Residential	485	35.50	36.92	447.30	Fixed		in 2015
589	17422	MURPHY AVE	8,844	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	489	11.50	12.20	121.78	Fixed		Assume 2-acre park site in this TAZ, in 2015
589	17422	MURPHY AVE	15,920	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	489	7.16	6.69	73.55	Redev	Res Potential	Assume 2-acre park site in this TAZ
590	16591	NOYES AVE	1,450	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	431	3.68	10.09	121.80	Redev	Res Potential	
590	2642	GATES AVE	1,871	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	431	2.43	2.58	25.76	Redev	Res Potential	
590	16591	NOYES AVE	2,704	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	431	3.52	3.73	37.23	Redev	Res Potential	
590	16591	NOYES AVE	5,227	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	431	2.35	2.20	24.15	Redev	Res Potential	
590	2642	GATES AVE	4,273	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	431	1.92	1.79	19.74	Redev	Res Potential	
591	16635	NOYES AVE	480	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	431	1.22	3.34	40.32	Redev	Res Potential	
591	16635	NOYES AVE	3,128	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	431	4.07	4.32	43.07	Redev	Res Potential	
591	16635	NOYES AVE	10,769	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	431	14.00	14.86	148.29	Redev	Res Potential	
591	16635	NOYES AVE	9,762	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	431	4.39	4.10	45.10	Redev	Res Potential	
592	16651	NOYES AVE	919	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	431	1.19	1.27	12.65	Redev	Res Potential	
592	16651	NOYES AVE	8,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	431	10.40	11.04	110.16	Redev	Res Potential	
592	16651	NOYES AVE	6,317	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	431	2.84	2.65	29.18	Redev	Res Potential	
593	16691	NOYES AVE	3,310	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	431	4.30	4.57	45.58	Redev	Res Potential	
593	16691	NOYES AVE	17,200	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	431	7.74	7.22	79.46	Redev	Res Potential	
594	16721	NOYES AVE	2,548	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	431	3.31	3.52	35.09	Redev	Res Potential	
594	16721	NOYES AVE	17,382	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	431	7.82	7.30	80.30	Redev	Res Potential	
595	16753	NOYES AVE	3,629	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	446	4.72	5.01	49.97	Redev	Res Potential	
595	16753	NOYES AVE	12,119	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	5.45	5.09	55.99	Redev	Res Potential	
596	16781	NOYES AVE	534	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	446	0.69	0.74	7.35	Redev	Res Potential	
596	16781	NOYES AVE	4,628	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	446	6.02	6.39	63.73	Redev	Res Potential	
596	16781	NOYES AVE	9,397	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	4.23	3.95	43.41	Redev	Res Potential	
597	16811	NOYES AVE	3,992	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	446	5.19	5.51	54.97	Redev	Res Potential	
597	16811	NOYES AVE	15,436	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	6.95	6.48	71.31	Redev	Res Potential	
598	16841	NOYES AVE	1,000	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	446	1.30	1.38	13.77	Redev	Res Potential	
598	16841	NOYES AVE	4,125	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	446	5.36	5.69	56.80	Redev	Res Potential	
598	16841	NOYES AVE	15,525	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	6.99	6.52	71.73	Redev	Res Potential	
599	16871	NOYES AVE	1,592	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	446	2.07	2.20	21.92	Redev	Res Potential	
599	16871	NOYES AVE	3,440	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	446	4.47	4.75	47.37	Redev	Res Potential	
599	16871	NOYES AVE	14,080	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	6.34	5.91	65.05	Redev	Res Potential	
600	4	PARK PLZ	188	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	503	0.48	1.31	15.79	Fixed		in 2015
600	0	PARK PLZ	1,823	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	503	2.37	2.52	25.10	Fixed		
600	2900	MAIN	150,093	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	503	195.12	207.13	2,066.78	Fixed		
600	4	PARK PLZ	417,023	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	503	542.13	575.49	5,742.41	Fixed		in 2015
600	4	PARK PLZ	8,766	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	503	3.94	3.68	40.50	Fixed		in 2015
600	5	PARK PLZ	3,267	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	509	8.30	22.74	274.43	Fixed		in 2015
600	0	PARK PLZ	4,058	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	509	5.28	5.60	55.88	Fixed		
600	3	PARK PLZ	417,023	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	509	542.13	575.49	5,742.41	Fixed		in 2015
600	5	PARK PLZ	417,118	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	509	542.25	575.62	5,743.71	Fixed		in 2015
601	17092	PULLMAN ST	3,846	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	396	5.00	5.31	52.96	Fixed		
601	17092	PULLMAN ST	4,400	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	396	5.72	6.07	60.59	Fixed		in 2015
601	17092	PULLMAN ST	24,600	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	396	11.07	10.33	113.65	Fixed		in 2015
602	17132	PULLMAN ST	17,600	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	396	22.88	24.29	242.35	Fixed		in 2015
602	17132	PULLMAN ST	39,088	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	396	17.59	16.42	180.59	Fixed		in 2015
602	17132	PULLMAN ST	15,500	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	396	6.98	6.51	71.61	Fixed		in 2015
603	17422	PULLMAN ST	3,759	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	400	4.89	5.19	51.76	Fixed		
603	17422	PULLMAN ST	13,406	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	400	17.43	18.50	184.60	Fixed		in 2015
603	17422	PULLMAN ST	22,594	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	400	10.17	9.49	104.38	Fixed		in 2015
604	17482	PULLMAN ST	5,525	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	400	7.18	7.62	76.08	Fixed		
604	17482	PULLMAN ST	15,535	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	400	20.20	21.44	213.92	Fixed		in 2015
604	17482	PULLMAN ST	91,150	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	400	41.02	38.28	421.11	Fixed		in 2015
605	16862	RED HILL AVE	12,052	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	398	30.61	83.88	1,012.37	Fixed		in 2015
605	16781	STANLEY	6,282	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	398	8.17	8.67	86.50	Fixed		in 2015
605	16781	STANLEY	5,184	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	398	2.33	2.18	23.95	Fixed		in 2015
605	16862	RED HILL AVE	13,234	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	398	5.96	5.56	61.14	Fixed		in 2015
606	17000	RED HILL AVE	22,256	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	407	28.93	30.71	306.47	Fixed		in 2015
606	17000	RED HILL AVE	28,261	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	407	36.74	39.00	389.15	Fixed		
606	17000	RED HILL AVE	117,130	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	407	52.71	49.19	541.14	Fixed		in 2015
607	17208	RED HILL AVE	725	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	415	0.94	1.00	9.98	Fixed		
607	17224	RED HILL AVE	1,225	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	415	1.59	1.69	16.87	Fixed		in 2015
607	17208	RED HILL AVE	1,400	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	415	1.82	1.93	19.28	Fixed		in 2015
607	17248	RED HILL AVE	1,400	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	415	1.82	1.93	19.28	Fixed		in 2015
607	17272	RED HILL AVE	1,400	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	415	1.82	1.93	19.28	Fixed		in 2015
607	17200	RED HILL AVE	1,955	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	415	2.54	2.70	26.92	Fixed		in 2015
607	17216	RED HILL AVE	2,245	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	415	2.92	3.10	30.91	Fixed		in 2015
607	17240	RED HILL AVE	2,430	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	415	3.16	3.35	33.46	Fixed		in 2015
607	17232	RED HILL AVE	2,475	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	415	3.22	3.42	34.08	Fixed		in 2015
607	17264	RED HILL AVE	4,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	415	5.20	5.52	55.08	Fixed		in 2015
607	17256	RED HILL AVE	4,700	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	415	6.11	6.49	64.72	Fixed		in 2015
607	17280	RED HILL AVE	4,800	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	415	6.24	6.62	66.10	Fixed		in 2015

IBC Vision Plan Database Snap Shot As Of July 10, 2009

Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
607	17288	RED HILL AVE	4,800	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	415	6.24	6.62	66.10	Fixed		in 2015
607	17264	RED HILL AVE	770	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	415	0.35	0.32	3.56	Fixed		in 2015
607	17240	RED HILL AVE	2,430	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	415	1.09	1.02	11.23	Fixed		in 2015
607	17232	RED HILL AVE	2,475	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	415	1.11	1.04	11.43	Fixed		in 2015
607	17272	RED HILL AVE	3,400	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	415	1.53	1.43	15.71	Fixed		in 2015
607	17248	RED HILL AVE	3,460	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	415	1.56	1.45	15.99	Fixed		in 2015
607	17224	RED HILL AVE	3,725	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	415	1.68	1.56	17.21	Fixed		in 2015
607	17216	RED HILL AVE	3,915	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	415	1.76	1.64	18.09	Fixed		in 2015
607	17200	RED HILL AVE	4,205	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	415	1.89	1.77	19.43	Fixed		in 2015
607	17208	RED HILL AVE	5,320	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	415	2.39	2.23	24.58	Fixed		in 2015
608	17300	RED HILL AVE	40,961	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	423	53.25	56.53	564.03	Fixed		in 2015
608	17320	RED HILL AVE	56,567	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	423	73.54	78.06	778.93	Fixed		in 2015
608	17310	RED HILL AVE	63,255	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	423	82.23	87.29	871.02	Fixed		in 2015
608	17330	RED HILL AVE	100,000	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	423	130.00	138.00	1,377.00	Fixed		
609	1400 Unit B203	REYNOLDS AVE	1,280	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	1.66	1.77	17.63	Fixed		in 2015
609	1420 Unit A203	REYNOLDS AVE	1,280	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	1.66	1.77	17.63	Fixed		in 2015
609	1400 Unit B202	REYNOLDS AVE	1,296	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	1.68	1.79	17.85	Fixed		in 2015
609	1420 Unit A202	REYNOLDS AVE	1,296	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	1.68	1.79	17.85	Fixed		in 2015
609	1400 Unit B201	REYNOLDS AVE	1,343	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	1.75	1.85	18.49	Fixed		in 2015
609	1420 Unit A201	REYNOLDS AVE	1,343	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	1.75	1.85	18.49	Fixed		in 2015
609	1400 Unit B101	REYNOLDS AVE	1,372	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	1.78	1.89	18.89	Fixed		in 2015
609	1420 Unit A101	REYNOLDS AVE	1,372	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	1.78	1.89	18.89	Fixed		in 2015
609	1400 Unit B204	REYNOLDS AVE	1,386	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	1.80	1.91	19.09	Fixed		in 2015
609	1420 Unit A204	REYNOLDS AVE	1,386	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	1.80	1.91	19.09	Fixed		in 2015
609	1400 Unit B102	REYNOLDS AVE	1,403	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	1.82	1.94	19.32	Fixed		in 2015
609	1420 Unit A102	REYNOLDS AVE	1,403	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	1.82	1.94	19.32	Fixed		in 2015
609	1400 Unit B205	REYNOLDS AVE	1,671	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.17	2.31	23.01	Fixed		in 2015
609	1420 Unit A205	REYNOLDS AVE	1,671	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.17	2.31	23.01	Fixed		in 2015
609	1400 Unit B111	REYNOLDS AVE	1,825	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.37	2.52	25.13	Fixed		in 2015
609	1420 Unit A111	REYNOLDS AVE	1,825	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.37	2.52	25.13	Fixed		in 2015
609	1400 Unit B110	REYNOLDS AVE	1,890	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.46	2.61	26.03	Fixed		in 2015
609	1420 Unit A110	REYNOLDS AVE	1,890	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.46	2.61	26.03	Fixed		in 2015
609	1400 Unit B112	REYNOLDS AVE	1,895	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.46	2.62	26.09	Fixed		in 2015
609	1420 Unit A112	REYNOLDS AVE	1,895	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.46	2.62	26.09	Fixed		in 2015
609	1400 Unit B108	REYNOLDS AVE	1,956	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.54	2.70	26.93	Fixed		in 2015
609	1420 Unit A108	REYNOLDS AVE	1,956	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.54	2.70	26.93	Fixed		in 2015
609	1400 Unit B107	REYNOLDS AVE	1,995	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.59	2.75	27.47	Fixed		in 2015
609	1420 Unit A107	REYNOLDS AVE	1,995	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.59	2.75	27.47	Fixed		in 2015
609	1400 Unit B106	REYNOLDS AVE	2,025	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.63	2.79	27.88	Fixed		in 2015
609	1420 Unit A106	REYNOLDS AVE	2,025	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.63	2.79	27.88	Fixed		in 2015
609	1400 Unit B104	REYNOLDS AVE	2,136	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.78	2.95	29.41	Fixed		in 2015
609	1420 Unit A104	REYNOLDS AVE	2,136	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.78	2.95	29.41	Fixed		in 2015
609	1400 Unit B105	REYNOLDS AVE	2,267	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.95	3.13	31.22	Fixed		in 2015
609	1420 Unit A105	REYNOLDS AVE	2,267	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	2.95	3.13	31.22	Fixed		in 2015
609	1400 Unit B109	REYNOLDS AVE	2,497	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	3.25	3.45	34.38	Fixed		in 2015
609	1420 Unit A109	REYNOLDS AVE	2,497	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	3.25	3.45	34.38	Fixed		in 2015
609	1400 Unit B103	REYNOLDS AVE	3,263	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	4.24	4.50	44.93	Fixed		in 2015
609	1420 Unit A103	REYNOLDS AVE	3,263	SF	Existing	122	Medical Office	PA36	5.1	IBC Multi-Use	408	4.24	4.50	44.93	Fixed		in 2015
610	17500	RED HILL AVE	2,980	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	432	3.87	4.11	41.03	Fixed		
610	17500	RED HILL AVE	40,097	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	432	52.13	55.33	552.14	Fixed		in 2015
611	17561	RED HILL AVE	2,555	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	441	6.49	17.78	214.62	Fixed		in 2015
612	1340	REYNOLDS AVE	910	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	408	2.31	6.33	76.44	Fixed		in 2015
612	1340	REYNOLDS AVE	2,294	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	408	2.98	3.17	31.59	Fixed		
612	1350	REYNOLDS AVE	15,799	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	408	20.54	21.80	217.55	Fixed		in 2015
612	1340	REYNOLDS AVE	17,505	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	408	22.76	24.16	241.04	Fixed		in 2015
612	1370	REYNOLDS AVE	22,281	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	408	28.97	30.75	306.81	Fixed		in 2015
612	1360	REYNOLDS AVE	25,198	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	408	32.76	34.77	346.98	Fixed		in 2015
612	1360	REYNOLDS AVE	5,304	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	408	2.39	2.23	24.50	Fixed		in 2015
612	1340	REYNOLDS AVE	9,030	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	408	4.06	3.79	41.72	Fixed		in 2015
612	1370	REYNOLDS AVE	16,287	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	408	7.33	6.84	75.25	Fixed		in 2015
612	1350	REYNOLDS AVE	19,799	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	408	8.91	8.32	91.47	Fixed		in 2015
613	1371	REYNOLDS AVE	4,401	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	413	5.72	6.07	60.60	Fixed		
613	1371	REYNOLDS AVE	12,316	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	413	16.01	17.00	169.59	Fixed		in 2015
613	1371	REYNOLDS AVE	6,884	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	413	3.10	2.89	31.80	Fixed		in 2015
614	1421	REYNOLDS AVE	52,945	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	413	68.83	73.06	729.05	Fixed		in 2015
614	1421	REYNOLDS AVE	56,923	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	413	74.00	78.55	783.83	Fixed		
614	1421	REYNOLDS AVE	46,863	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	413	21.09	19.68	216.51	Fixed		in 2015
615	17521	GILLETTE AVE	203	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	432	0.26	0.28	2.80	Fixed		
615	17521	GILLETTE AVE	12,652	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	432	16.45	17.46	174.22	Fixed		in 2015
615	1562	REYNOLDS AVE	15,809	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	432	20.55	21.82	217.69	Fixed		
615	1562	REYNOLDS AVE	18,323	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	432	23.82	25.29	252.31	Fixed		in 2015
615	1562	REYNOLDS AVE	43,919	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	432	19.76	18.45	202.91	Fixed		in 2015
616	1641	REYNOLDS AVE	2,514	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	434	3.27	3.47	34.62	Fixed		
616	1641	REYNOLDS AVE	5,395	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	7.01	7.45	74.29	Fixed		in 2015
616	1641	REYNOLDS AVE	12,105	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	434	5.45	5.08	55.93	Fixed		in 2015
617	1671	REYNOLDS AVE	8,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	11.05	11.73	117.05	Fixed		in 2015
618	1672	REYNOLDS AVE	67,182	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	439	30.23	28.22	310.38	Fixed		in 2015
619	1701	REYNOLDS AVE	8,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	10.40	11.04	110.16	Fixed		in 2015
619	1701	REYNOLDS AVE	4,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	434	1.80	1.68	18.48	Fixed		in 2015
620	1731	REYNOLDS AVE	251	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	434	0.33	0.35	3.46	Fixed		
620	1731	REYNOLDS AVE	5,400	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	7.02	7.45	74.36	Fixed		in 2015
620	1731	REYNOLDS AVE	6,360	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	434	2.86	2.67	29.38	Fixed		in 2015
621	1732	REYNOLDS AVE	24,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	439	31.20	33.12	330.48	Fixed		in 2015

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
622	1761	REYNOLDS AVE	10,331	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	13.43	14.26	142.26	Fixed		in 2015
622	1761	REYNOLDS AVE	11,353	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	434	14.76	15.67	156.33	Fixed		
622	1761	REYNOLDS AVE	8,477	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	434	3.81	3.56	39.16	Fixed		in 2015
623	1772	REYNOLDS AVE	8,227	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	439	10.70	11.35	113.29	Fixed		
623	1772	REYNOLDS AVE	15,940	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	439	20.72	22.00	219.49	Fixed		in 2015
623	1772	REYNOLDS AVE	15,060	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	439	6.78	6.33	69.58	Fixed		in 2015
624	1791	REYNOLDS AVE	5,702	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	7.41	7.87	78.52	Fixed		in 2015
624	1791	REYNOLDS AVE	7,362	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	434	3.31	3.09	34.01	Fixed		in 2015
625	1821	REYNOLDS AVE	3,607	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	434	4.69	4.98	49.67	Fixed		
625	1821	REYNOLDS AVE	12,480	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	434	5.62	5.24	57.66	Fixed		in 2015
626	1822	REYNOLDS AVE	10,933	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	439	14.21	15.09	150.55	Fixed		in 2015
626	1822	REYNOLDS AVE	12,420	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	439	16.15	17.14	171.02	Fixed		
626	1822	REYNOLDS AVE	47,067	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	439	21.18	19.77	217.45	Fixed		in 2015
627	1842	REYNOLDS AVE	3,800	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	439	4.94	5.24	52.33	Fixed		in 2015
627	1842	REYNOLDS AVE	5,493	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	439	7.14	7.58	75.64	Fixed		
627	1842	REYNOLDS AVE	14,200	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	439	6.39	5.96	65.60	Fixed		in 2015
628	1861	REYNOLDS AVE	1,719	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	2.23	2.37	23.67	Fixed		in 2015
628	1861	REYNOLDS AVE	2,434	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	434	3.16	3.36	33.52	Fixed		
628	1861	REYNOLDS AVE	10,178	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	434	4.58	4.27	47.02	Fixed		in 2015
629	1881	REYNOLDS AVE	3,069	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	434	3.99	4.24	42.26	Fixed		
629	1881	REYNOLDS AVE	8,622	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	434	11.21	11.90	118.72	Fixed		in 2015
629	1881	REYNOLDS AVE	10,667	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	434	4.80	4.48	49.28	Fixed		in 2015
630	2691	RICHTER AVE	37,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	446	48.75	51.75	516.38	Redev	Potential Retail Site, otherwise residential	
630	2691	RICHTER AVE	24,190	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	446	10.89	10.16	111.76	Redev		
631	17744	SKY PARK BLVD	23,480	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	30.52	32.40	323.32	Fixed		in 2015
631	17748	SKY PARK BLVD	30,580	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	39.75	42.20	421.09	Fixed		in 2015
631	17752	SKY PARK BLVD	30,580	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	39.75	42.20	421.09	Fixed		in 2015
632	17785	SKY PARK BLVD	4,350	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	441	11.05	30.28	365.40	Fixed		in 2015
632	17781	SKY PARK BLVD	3,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	4.55	4.83	48.20	Fixed		in 2015
632	17755	SKY PARK BLVD	4,500	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	5.85	6.21	61.97	Fixed		in 2015
632	17785	SKY PARK BLVD	6,405	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	8.33	8.84	88.20	Fixed		in 2015
632	17751	SKY PARK BLVD	7,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	9.10	9.66	96.39	Fixed		in 2015
632	17755	SKY PARK BLVD	5,500	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	2.48	2.31	25.41	Fixed		in 2015
632	17785	SKY PARK BLVD	10,045	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	4.52	4.22	46.41	Fixed		in 2015
632	17751	SKY PARK BLVD	11,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	4.95	4.62	50.82	Fixed		in 2015
632	17781	SKY PARK BLVD	11,500	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	5.18	4.83	53.13	Fixed		in 2015
633	18007	SKY PARK BLVD	2,573	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	470	6.54	17.91	216.13	Fixed		in 2015
633	17779	SKY PARK BLVD	2,782	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	470	7.07	19.36	233.69	Fixed		in 2015
633	18013	SKY PARK BLVD	10,000	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	470	25.40	69.60	840.00	Fixed		in 2015
633	18103	SKY PARK BLVD	18,640	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	470	47.35	129.73	1,565.76	Fixed		in 2015
633	18003	SKY PARK BLVD	19,890	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	470	50.52	138.43	1,670.76	Fixed		in 2015
633	17779	SKY PARK BLVD	3,794	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	470	4.93	5.24	52.24	Fixed		in 2015
633	18011	SKY PARK BLVD	6,075	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	470	7.90	8.38	83.65	Fixed		in 2015
633	18011	SKY PARK BLVD	6,708	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	470	8.72	9.26	92.37	Fixed		
633	17775	SKY PARK BLVD	7,788	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	470	10.12	10.75	107.24	Fixed		in 2015
633	17777	SKY PARK BLVD	12,256	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	470	15.93	16.91	168.77	Fixed		in 2015
633	18007	SKY PARK BLVD	17,077	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	470	22.20	23.57	235.15	Fixed		in 2015
633	18005	SKY PARK BLVD	19,580	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	470	25.45	27.02	269.62	Fixed		in 2015
633	18009	SKY PARK BLVD	19,580	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	470	25.45	27.02	269.62	Fixed		in 2015
633	17779	SKY PARK BLVD	4,764	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	470	2.14	2.00	22.01	Fixed		in 2015
633	17775	SKY PARK BLVD	7,787	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	470	3.50	3.27	35.98	Fixed		in 2015
633	17777	SKY PARK BLVD	12,265	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	470	5.52	5.15	56.66	Fixed		in 2015
633	18011	SKY PARK BLVD	14,175	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	470	6.38	5.95	65.49	Fixed		in 2015
634	17782	SKY PARK BLVD	15,543	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	20.21	21.45	214.03	Fixed		in 2015
635	17805	SKY PARK BLVD	80	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	441	0.20	0.56	6.72	Fixed		in 2015
635	17831	SKY PARK BLVD	1,890	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	441	4.80	13.15	158.76	Fixed		in 2015
635	17835	SKY PARK BLVD	12,800	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	441	32.51	89.09	1,075.20	Fixed		in 2015
635	17805	SKY PARK BLVD	3,213	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	4.18	4.43	44.24	Fixed		in 2015
635	17801	SKY PARK BLVD	6,502	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	8.45	8.97	89.53	Fixed		in 2015
635	17831	SKY PARK BLVD	6,696	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	8.70	9.24	92.20	Fixed		in 2015
635	17821	SKY PARK BLVD	7,802	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	10.14	10.77	107.43	Fixed		in 2015
635	17811	SKY PARK BLVD	8,047	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	10.46	11.10	110.81	Fixed		in 2015
635	17791	SKY PARK BLVD	9,145	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	11.89	12.62	125.93	Fixed		in 2015
635	17795	SKY PARK BLVD	9,145	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	11.89	12.62	125.93	Fixed		in 2015
635	17815	SKY PARK BLVD	9,617	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	12.50	13.27	132.43	Fixed		in 2015
635	17791	SKY PARK BLVD	16,895	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	441	21.96	23.32	232.64	Fixed		
635	17805	SKY PARK BLVD	7,907	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	3.56	3.32	36.53	Fixed		in 2015
635	17801	SKY PARK BLVD	9,498	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	4.27	3.99	43.88	Fixed		in 2015
635	17821	SKY PARK BLVD	11,398	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	5.13	4.79	52.66	Fixed		in 2015
635	17811	SKY PARK BLVD	11,753	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	5.29	4.94	54.30	Fixed		in 2015
635	17791	SKY PARK BLVD	13,355	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	6.01	5.61	61.70	Fixed		in 2015
635	17795	SKY PARK BLVD	13,355	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	6.01	5.61	61.70	Fixed		in 2015
635	17815	SKY PARK BLVD	14,048	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	6.32	5.90	64.90	Fixed		in 2015
635	17831	SKY PARK BLVD	18,859	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	8.49	7.92	87.13	Fixed		in 2015
636	17802	SKY PARK BLVD	18,958	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	24.65	26.16	261.05	Fixed		in 2015
637	17842	SKY PARK BLVD	6,469	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	459	8.41	8.93	89.08	Fixed		
637	17842	SKY PARK BLVD	10,200	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	459	4.59	4.28	47.12	Fixed		in 2015
638	17865	SKY PARK BLVD	1,000	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	441	2.54	6.96	84.00	Fixed		in 2015
638	17855	SKY PARK BLVD	1,290	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	441	3.28	8.98	108.36	Fixed		in 2015
638	17875	SKY PARK BLVD	2,000	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	441	5.08	13.92	168.00	Fixed		in 2015
638	17851	SKY PARK BLVD	5,000	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	441	12.70	34.80	420.00	Fixed		in 2015
638	17855	SKY PARK BLVD	3,462	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	4.50	4.78	47.67	Fixed		in 2015
638	17851	SKY PARK BLVD	4,915	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	6.39	6.78	67.68	Fixed		in 2015

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
638	17871	SKY PARK BLVD	5,900	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	7.67	8.14	81.24	Fixed		in 2015
638	17845	SKY PARK BLVD	6,440	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	8.37	8.89	88.68	Fixed		in 2015
638	17865	SKY PARK BLVD	7,380	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	9.59	10.18	101.62	Fixed		in 2015
638	17875	SKY PARK BLVD	7,720	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	441	10.04	10.65	106.30	Fixed		in 2015
638	17855	SKY PARK BLVD	2,424	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	1.09	1.02	11.20	Fixed		in 2015
638	17871	SKY PARK BLVD	4,100	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	1.85	1.72	18.94	Fixed		in 2015
638	17851	SKY PARK BLVD	7,685	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	3.46	3.23	35.50	Fixed		in 2015
638	17845	SKY PARK BLVD	9,560	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	4.30	4.02	44.17	Fixed		in 2015
638	17865	SKY PARK BLVD	12,370	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	5.57	5.20	57.15	Fixed		in 2015
638	17875	SKY PARK BLVD	13,280	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	441	5.98	5.58	61.35	Fixed		in 2015
639	17848	SKY PARK BLVD	15,150	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	19.70	20.91	208.62	Fixed		in 2015
640	17850	SKY PARK BLVD	3,623	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	459	4.71	5.00	49.89	Fixed		
640	17850	SKY PARK BLVD	17,941	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	459	8.07	7.54	82.89	Fixed		in 2015
641	17880	SKY PARK BLVD	10,920	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	14.20	15.07	150.37	Fixed		in 2015
641	17900	SKY PARK BLVD	11,520	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	14.98	15.90	158.63	Fixed		in 2015
641	17870	SKY PARK BLVD	14,880	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	19.34	20.53	204.90	Fixed		in 2015
641	17910	SKY PARK BLVD	14,880	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	19.34	20.53	204.90	Fixed		in 2015
641	17890	SKY PARK BLVD	17,250	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	22.43	23.81	237.53	Fixed		in 2015
642	17881	SKY PARK BLVD	13,900	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	448	35.31	96.74	1,167.60	Fixed		in 2015
642	17885	SKY PARK BLVD	9,188	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	448	11.94	12.68	126.52	Fixed		in 2015
642	17891	SKY PARK BLVD	17,188	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	448	22.34	23.72	236.68	Fixed		in 2015
642	17895	SKY PARK BLVD	17,188	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	448	22.34	23.72	236.68	Fixed		in 2015
642	17885	SKY PARK BLVD	812	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	448	0.37	0.34	3.75	Fixed		in 2015
642	17891	SKY PARK BLVD	812	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	448	0.37	0.34	3.75	Fixed		in 2015
642	17895	SKY PARK BLVD	812	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	448	0.37	0.34	3.75	Fixed		in 2015
642	17881	SKY PARK BLVD	1,100	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	448	0.50	0.46	5.08	Fixed		in 2015
643	17915	SKY PARK BLVD	9,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	448	11.70	12.42	123.93	Fixed		in 2015
643	17921	SKY PARK BLVD	9,555	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	448	12.42	13.19	131.57	Fixed		in 2015
643	17905	SKY PARK BLVD	12,400	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	448	16.12	17.11	170.75	Fixed		in 2015
643	17911	SKY PARK BLVD	13,600	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	448	17.68	18.77	187.27	Fixed		in 2015
643	17925	SKY PARK BLVD	18,400	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	448	23.92	25.39	253.37	Fixed		in 2015
643	17921	SKY PARK BLVD	5,645	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	448	2.54	2.37	26.08	Fixed		in 2015
643	17915	SKY PARK BLVD	9,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	448	4.05	3.78	41.58	Fixed		in 2015
643	17905	SKY PARK BLVD	12,400	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	448	5.58	5.21	57.29	Fixed		in 2015
644	17952	SKY PARK BLVD	4,880	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	459	12.40	33.96	409.92	Fixed		in 2015
644	17982	SKY PARK BLVD	7,290	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	9.48	10.06	100.38	Fixed		in 2015
644	17972	SKY PARK BLVD	9,790	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	12.73	13.51	134.81	Fixed		in 2015
644	17942	SKY PARK BLVD	9,935	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	12.92	13.71	136.80	Fixed		in 2015
644	17932	SKY PARK BLVD	12,460	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	16.20	17.19	171.57	Fixed		in 2015
644	17952	SKY PARK BLVD	12,595	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	16.37	17.38	173.43	Fixed		in 2015
644	17962	SKY PARK BLVD	12,789	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	16.63	17.65	176.10	Fixed		in 2015
644	17922	SKY PARK BLVD	13,363	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	17.37	18.44	184.01	Fixed		in 2015
644	17922	SKY PARK BLVD	6,657	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	459	3.00	2.80	30.76	Fixed		in 2015
644	17982	SKY PARK BLVD	7,290	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	459	3.28	3.06	33.68	Fixed		in 2015
645	17985	SKY PARK BLVD	3,413	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	457	4.44	4.71	47.00	Fixed		in 2015
645	17941	SKY PARK BLVD	3,822	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	457	4.97	5.27	52.63	Fixed		in 2015
645	17965	SKY PARK BLVD	3,822	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	457	4.97	5.27	52.63	Fixed		in 2015
645	17931	SKY PARK BLVD	4,914	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	457	6.39	6.78	67.67	Fixed		in 2015
645	17975	SKY PARK BLVD	5,119	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	457	6.65	7.06	70.49	Fixed		in 2015
645	17955	SKY PARK BLVD	5,665	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	457	7.36	7.82	78.01	Fixed		in 2015
645	17945	SKY PARK BLVD	6,061	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	457	7.88	8.36	83.46	Fixed		in 2015
645	17971	SKY PARK BLVD	6,552	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	457	8.52	9.04	90.22	Fixed		in 2015
645	17961	SKY PARK BLVD	7,064	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	457	9.18	9.75	97.27	Fixed		in 2015
645	17951	SKY PARK BLVD	8,846	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	457	11.50	12.21	121.81	Fixed		in 2015
645	17981	SKY PARK BLVD	10,661	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	457	13.86	14.71	146.80	Fixed		in 2015
645	17935	SKY PARK BLVD	12,180	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	457	15.83	16.81	167.72	Fixed		in 2015
645	17931	SKY PARK BLVD	44,299	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	457	57.59	61.13	610.00	Fixed		
645	17985	SKY PARK BLVD	6,587	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	457	2.96	2.77	30.43	Fixed		in 2015
645	17941	SKY PARK BLVD	7,378	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	457	3.32	3.10	34.09	Fixed		in 2015
645	17965	SKY PARK BLVD	7,378	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	457	3.32	3.10	34.09	Fixed		in 2015
645	17931	SKY PARK BLVD	9,486	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	457	4.27	3.98	43.83	Fixed		in 2015
645	17935	SKY PARK BLVD	9,660	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	457	4.35	4.06	44.63	Fixed		in 2015
645	17975	SKY PARK BLVD	9,881	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	457	4.45	4.15	45.65	Fixed		in 2015
645	17955	SKY PARK BLVD	10,935	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	457	4.92	4.59	50.52	Fixed		in 2015
645	17945	SKY PARK BLVD	11,699	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	457	5.26	4.91	54.05	Fixed		in 2015
645	17971	SKY PARK BLVD	12,648	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	457	5.69	5.31	58.43	Fixed		in 2015
645	17961	SKY PARK BLVD	13,636	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	457	6.14	5.73	63.00	Fixed		in 2015
645	17951	SKY PARK BLVD	17,074	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	457	7.68	7.17	78.88	Fixed		in 2015
645	17981	SKY PARK BLVD	20,579	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	457	9.26	8.64	95.07	Fixed		in 2015
646	18001	SKY PARK BLVD	7,968	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	466	20.24	55.46	669.31	Fixed		in 2015
646	18092	SKY PARK BLVD	4,390	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	466	5.71	6.06	60.45	Fixed		in 2015
646	18102	SKY PARK BLVD	14,339	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	466	18.64	19.79	197.45	Fixed		in 2015
646	18001	SKY PARK BLVD	17,746	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	466	23.07	24.49	244.36	Fixed		in 2015
646	18092	SKY PARK BLVD	6,400	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	466	2.88	2.69	29.57	Fixed		in 2015
646	18102	SKY PARK BLVD	6,400	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	466	2.88	2.69	29.57	Fixed		in 2015
647	18002	SKY PARK BLVD	17,318	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	22.51	23.90	238.47	Fixed		in 2015
648	18004	SKY PARK BLVD	25,044	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	32.56	34.56	344.86	Fixed		in 2015
649	18006	SKY PARK BLVD	25,044	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	32.56	34.56	344.86	Fixed		in 2015
650	18008	SKY PARK BLVD	25,044	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	32.56	34.56	344.86	Fixed		in 2015
651	18010	SKY PARK BLVD	25,044	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	32.56	34.56	344.86	Fixed		in 2015
652	18012	SKY PARK BLVD	14,544	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	459	18.91	20.07	200.27	Fixed		in 2015
653	18025	SKY PARK BLVD	2,413	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	470	6.13	16.79	202.69	Fixed		in 2015
653	18019	SKY PARK BLVD	6,388	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	470	8.30	8.82	87.96	Fixed		in 2015

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
653	18023	SKY PARK BLVD	9,540	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	470	12.40	13.17	131.37	Fixed		in 2015
653	18025	SKY PARK BLVD	13,787	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	470	17.92	19.03	189.85	Fixed		in 2015
653	18021	SKY PARK BLVD	17,257	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	470	22.43	23.81	237.63	Fixed		in 2015
653	18019	SKY PARK BLVD	6,387	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	470	2.87	2.68	29.51	Fixed		in 2015
653	18021	SKY PARK BLVD	9,293	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	470	4.18	3.90	42.93	Fixed		in 2015
653	18023	SKY PARK BLVD	9,540	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	470	4.29	4.01	44.07	Fixed		in 2015
653	18017	SKY PARK BLVD	14,175	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	470	6.38	5.95	65.49	Fixed		in 2015
654	16811	STANLEY	853	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	398	1.11	1.18	11.75	Fixed		
654	16811	STANLEY	4,908	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	398	6.38	6.77	67.58	Fixed		in 2015
654	16811	STANLEY	5,724	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	398	2.58	2.40	26.44	Fixed		in 2015
655	16831	STANLEY	6,268	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	398	8.15	8.65	86.31	Fixed		in 2015
655	16831	STANLEY	5,265	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	398	2.37	2.21	24.32	Fixed		in 2015
656	18582	TELLER AVE	7,750	SF	Discretionary Approval	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	535	19.69	53.94	651.00	Fixed		in 2015
656	18582	TELLER AVE	-66,667	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	535	-86.67	-92.00	-918.00	Fixed		
656	18582	TELLER AVE	66,667	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	535	86.67	92.00	918.00	Fixed		
656	18582	TELLER AVE	290,000	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	535	377.00	400.20	3,993.30	Fixed		in 2015
657	18818	TELLER AVE	8,464	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	542	11.00	11.68	116.55	Fixed		
657	18818	TELLER AVE	52,974	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	542	68.87	73.10	729.45	Fixed		in 2015
658	18842	TELLER AVE	5,780	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	545	7.51	7.98	79.59	Redev	Res Potential	
658	18842	TELLER AVE	18,711	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	545	24.32	25.82	257.65	Redev	Res Potential	
658	18842	TELLER AVE	60,360	SF	Existing	130	Church, Synagogue	PA36	5.1	IBC Multi-Use	545	27.16	25.35	278.86	Redev	Res Potential	
661	17885	VON KARMAN AVE	152,821	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	478	198.67	210.89	2,104.35	Redev	Non-Res Optimization	
662	16666	VON KARMAN AVE	15,862	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	416	20.62	21.89	218.42	Fixed		
662	16666	VON KARMAN AVE	39,286	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	416	51.07	54.21	540.97	Fixed		in 2015
662	16666	VON KARMAN AVE	43,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	416	19.35	18.06	198.66	Fixed		in 2015
662	16666	VON KARMAN AVE	52,000	SF	Discretionary Approval	123	Manufacturing	PA36	5.1	IBC Multi-Use	416	23.40	21.84	240.24	Fixed		
663	16702	VON KARMAN AVE	6,188	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	416	8.04	8.54	85.21	Fixed		
663	16702	VON KARMAN AVE	24,183	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	416	31.44	33.37	333.00	Fixed		in 2015
663	16702	VON KARMAN AVE	66,889	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	416	30.10	28.09	309.03	Fixed		in 2015
664	16782 Unit 25	VON KARMAN AVE	476	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	429	0.62	0.66	6.55	Redev	Non-Res Optimization	
664	16782 Unit 25	VON KARMAN AVE	518	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	429	0.67	0.71	7.13	Redev	Non-Res Optimization	
664	16782 Unit 30	VON KARMAN AVE	588	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	429	0.76	0.81	8.10	Redev	Non-Res Optimization	
664	16782 Unit 33	VON KARMAN AVE	590	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	429	0.77	0.81	8.12	Redev	Non-Res Optimization	
664	16782 Unit 23	VON KARMAN AVE	600	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	429	0.78	0.83	8.26	Redev	Non-Res Optimization	
664	16782 Unit 31	VON KARMAN AVE	600	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	429	0.78	0.83	8.26	Redev	Non-Res Optimization	
664	16782 Unit 32	VON KARMAN AVE	600	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	429	0.78	0.83	8.26	Redev	Non-Res Optimization	
664	16782 Unit 15	VON KARMAN AVE	719	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	429	0.93	0.99	9.90	Redev	Non-Res Optimization	
664	16782 Unit 17	VON KARMAN AVE	914	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	429	1.19	1.26	12.59	Redev	Non-Res Optimization	
664	16782 Unit 16	VON KARMAN AVE	938	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	429	1.22	1.29	12.92	Redev	Non-Res Optimization	
664	16782 Unit 24	VON KARMAN AVE	954	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	429	1.24	1.32	13.14	Redev	Non-Res Optimization	
664	16782 Unit 14	VON KARMAN AVE	1,053	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	429	1.37	1.45	14.50	Redev	Non-Res Optimization	
664	16782 Unit 11	VON KARMAN AVE	1,669	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	429	2.17	2.30	22.98	Redev	Non-Res Optimization	
664	16782 Unit 21	VON KARMAN AVE	1,669	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	429	2.17	2.30	22.98	Redev	Non-Res Optimization	
664	16782 Unit 20	VON KARMAN AVE	2,894	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	429	3.76	3.99	39.85	Redev	Non-Res Optimization	
664	16782 Unit 22	VON KARMAN AVE	3,045	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	429	3.96	4.20	41.93	Redev	Non-Res Optimization	
664	16782 Unit 10	VON KARMAN AVE	4,304	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	429	5.60	5.94	59.27	Redev		
664	16782 Unit 12	VON KARMAN AVE	5,971	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	429	7.76	8.24	82.22	Redev	Non-Res Optimization	
664	16782 Unit 10	VON KARMAN AVE	55	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	0.02	0.02	0.25	Redev	Non-Res Optimization	
664	16782 Unit 11	VON KARMAN AVE	56	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	0.03	0.02	0.26	Redev	Non-Res Optimization	
664	16782 Unit 20	VON KARMAN AVE	56	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	0.03	0.02	0.26	Redev	Non-Res Optimization	
664	16782 Unit 21	VON KARMAN AVE	56	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	0.03	0.02	0.26	Redev	Non-Res Optimization	
664	16782 Unit 22	VON KARMAN AVE	56	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	0.03	0.02	0.26	Redev	Non-Res Optimization	
664	16782 Unit 12	VON KARMAN AVE	1,701	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	0.77	0.71	7.86	Redev	Non-Res Optimization	
664	16782 Unit 33	VON KARMAN AVE	4,632	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	2.08	1.95	21.40	Redev	Non-Res Optimization	
664	16782 Unit 30	VON KARMAN AVE	4,775	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	2.15	2.01	22.06	Redev	Non-Res Optimization	
664	16782 Unit 31	VON KARMAN AVE	4,791	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	2.16	2.01	22.13	Redev	Non-Res Optimization	
664	16782 Unit 32	VON KARMAN AVE	4,791	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	2.16	2.01	22.13	Redev	Non-Res Optimization	
664	16782 Unit 17	VON KARMAN AVE	5,898	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	2.65	2.48	27.25	Redev	Non-Res Optimization	
664	16782 Unit 16	VON KARMAN AVE	6,231	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	2.80	2.62	28.79	Redev	Non-Res Optimization	
664	16782 Unit 24	VON KARMAN AVE	6,503	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	2.93	2.73	30.04	Redev	Non-Res Optimization	
664	16782 Unit 23	VON KARMAN AVE	7,002	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	3.15	2.94	32.35	Redev	Non-Res Optimization	
664	16782 Unit 14	VON KARMAN AVE	7,142	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	3.21	3.00	33.00	Redev	Non-Res Optimization	
664	16782 Unit 15	VON KARMAN AVE	8,186	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	3.68	3.44	37.82	Redev	Non-Res Optimization	
664	16782 Unit 25	VON KARMAN AVE	8,910	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	4.01	3.74	41.16	Redev	Non-Res Optimization	
665	16842	VON KARMAN AVE	12,547	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	429	16.31	17.31	172.77	Redev	Non-Res Optimization	
665	16842	VON KARMAN AVE	71,504	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	429	92.96	98.68	984.61	Redev	Non-Res Optimization	
665	16842	VON KARMAN AVE	27,840	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	12.53	11.69	128.62	Redev	Non-Res Optimization	
666	16902	VON KARMAN AVE	2,885	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	429	3.75	3.98	39.73	Redev	Non-Res Optimization	
666	16902	VON KARMAN AVE	6,008	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	429	7.81	8.29	82.73	Redev	Non-Res Optimization	
666	16902	VON KARMAN AVE	34,966	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	15.73	14.69	161.54	Redev	Non-Res Optimization	
667	16912	VON KARMAN AVE	6,558	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	429	8.53	9.05	90.30	Redev	Non-Res Optimization	
667	16912	VON KARMAN AVE	10,479	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	429	13.62	14.46	144.30	Redev	Non-Res Optimization	
667	16912	VON KARMAN AVE	44,034	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	429	19.82	18.49	203.44	Redev	Non-Res Optimization	
668	17221	VON KARMAN AVE	10,220	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	447	13.29	14.10	140.73	Redev	Non-Res Optimization	
668	17221	VON KARMAN AVE	12,826	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	447	16.67	17.70	176.61	Redev	Non-Res Optimization	
668	17221	VON KARMAN AVE	76,662	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	447	34.50	32.20	354.18	Redev	Non-Res Optimization	
669	17138	VON KARMAN AVE	1,521	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	445	1.98	2.10	20.94	Redev	Non-Res Optimization	
669	2200	ALTON PKWY	3,648	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	445	4.74	5.03	50.23	Redev	Non-Res Optimization	
669	17138	VON KARMAN AVE	8,681	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	445	11.29	11.98	119.54	Redev	Non-Res Optimization	
669	2200	ALTON PKWY	23,320	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	445	10.49	9.79	107.74	Redev	Non-Res Optimization	
669	17138	VON KARMAN AVE	24,029	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	445	10.81	10.09	111.01	Redev	Non-Res Optimization	
670	17145	VON KARMAN AVE	3,724	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	447	9.46	25.92	312.82	Redev	Non-Res Optimization	
670	17145	VON KARMAN AVE	2,736	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	447	3.56	3.78	37.67	Redev	Non-Res Optimization	

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Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
670	17175	VON KARMAN AVE	2,981	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	447	3.88	4.11	41.05	Redev	Non-Res Optimization	
670	17155	VON KARMAN AVE	5,843	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	447	7.60	8.06	80.46	Redev	Non-Res Optimization	
670	17165	VON KARMAN AVE	5,843	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	447	7.60	8.06	80.46	Redev	Non-Res Optimization	
670	17145	VON KARMAN AVE	6,457	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	447	2.91	2.71	29.83	Redev	Non-Res Optimization	
670	17165	VON KARMAN AVE	8,710	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	447	3.92	3.66	40.24	Redev	Non-Res Optimization	
670	17175	VON KARMAN AVE	10,316	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	447	4.64	4.33	47.66	Redev	Non-Res Optimization	
670	17155	VON KARMAN AVE	15,838	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	447	7.13	6.65	73.17	Redev	Non-Res Optimization	
671	17150	VON KARMAN AVE	61	DU	Density Bonus/Pending Approval	102	Condominiums	PA36	5.1	IBC Multi-Use	445	30.50	31.72	384.30	Fixed		in 2015
671	17150	VON KARMAN AVE	174	DU	Pending Approval	102	Condominiums	PA36	5.1	IBC Multi-Use	445	87.00	90.48	1,096.20	Fixed		in 2015
671	17150	VON KARMAN AVE	-30,004	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	445	-39.01	-41.41	-413.16	Fixed		
671	17150	VON KARMAN AVE	-520	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	445	-0.68	-0.72	-7.16	Fixed		
671	17150	VON KARMAN AVE	520	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	445	0.68	0.72	7.16	Fixed		
671	17150	VON KARMAN AVE	30,004	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	445	39.01	41.41	413.16	Fixed		in 2015
671	17150	VON KARMAN AVE	-50,706	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	445	-22.82	-21.30	-234.26	Fixed		
671	17150	VON KARMAN AVE	50,706	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	445	22.82	21.30	234.26	Fixed		in 2015
671	17150	VON KARMAN AVE	61	DU	Density Bonus/Pending Approval	102	Condominiums	PA36	5.1	IBC Multi-Use	455	30.50	31.72	384.30	Fixed		in 2015
671	17150	VON KARMAN AVE	173	DU	Pending Approval	102	Condominiums	PA36	5.1	IBC Multi-Use	455	86.50	89.96	1,089.90	Fixed		in 2015
671	17150	VON KARMAN AVE	-30,004	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	455	-39.01	-41.41	-413.16	Fixed		
671	17150	VON KARMAN AVE	-521	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	455	-0.68	-0.72	-7.17	Fixed		
671	17150	VON KARMAN AVE	521	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	455	0.68	0.72	7.17	Fixed		
671	17150	VON KARMAN AVE	30,004	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	455	39.01	41.41	413.16	Fixed		in 2015
671	17150	VON KARMAN AVE	-50,707	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	455	-22.82	-21.30	-234.27	Fixed		
671	17150	VON KARMAN AVE	50,707	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	455	22.82	21.30	234.27	Fixed		in 2015
672	17222	VON KARMAN AVE	5,087	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	455	6.61	7.02	70.05	Redev	Non-Res Optimization	
672	17222	VON KARMAN AVE	8,051	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	455	10.47	11.11	110.86	Redev	Non-Res Optimization	
672	17222	VON KARMAN AVE	45,603	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	455	20.52	19.15	210.69	Redev	Non-Res Optimization	
673	17305	VON KARMAN AVE	40,209	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	458	52.27	55.49	553.68	Redev	Non-Res Optimization	
674	17352	VON KARMAN AVE	-26,811	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	468	-34.85	-37.00	-369.19	Redev	Non-Res Optimization	
674	17352	VON KARMAN AVE	-11,285	SF	RA Future Demo	121	Office	PA36	5.1	IBC Multi-Use	468	-14.67	-15.57	-155.39	Redev	Non-Res Optimization	
674	17352	VON KARMAN AVE	6,347	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	468	8.25	8.76	87.40	Redev	Non-Res Optimization	
674	17352	VON KARMAN AVE	11,285	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	468	14.67	15.57	155.39	Redev	Non-Res Optimization	
674	17352	VON KARMAN AVE	26,811	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	468	34.85	37.00	369.19	Redev	Non-Res Optimization	
674	17352	VON KARMAN AVE	39,955	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	468	51.94	55.14	550.18	Fixed		in 2015
674	17352	VON KARMAN AVE	-82,078	SF	RA Future Demo	123	Manufacturing	PA36	5.1	IBC Multi-Use	468	-36.94	-34.47	-379.20	Redev	Non-Res Optimization	
674	17352	VON KARMAN AVE	55,007	SF	Discretionary Approval	123	Manufacturing	PA36	5.1	IBC Multi-Use	468	24.75	23.10	254.13	Fixed		in 2015
674	17352	VON KARMAN AVE	82,078	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	468	36.94	34.47	379.20	Redev	Non-Res Optimization	
675	17421	VON KARMAN AVE	16,673	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	461	21.67	23.01	229.59	Redev	Non-Res Optimization	
675	17421	VON KARMAN AVE	26,391	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	461	34.31	36.42	363.40	Redev	Non-Res Optimization	
675	17421	VON KARMAN AVE	106,133	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	461	47.76	44.58	490.33	Redev	Non-Res Optimization	
676	17451	VON KARMAN AVE	15,410	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	461	20.03	21.27	212.20	Fixed	Fixed	in 2015
676	17451	VON KARMAN AVE	24,763	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	461	32.19	34.17	340.99	Fixed	Fixed	
676	17451	VON KARMAN AVE	78,560	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	461	35.35	33.00	362.95	Fixed	Fixed	in 2015
677	17462	VON KARMAN AVE	15,430	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	468	20.06	21.29	212.47	Redev	Non-Res Optimization	
677	17462	VON KARMAN AVE	31,884	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	468	41.45	44.00	439.04	Redev	Non-Res Optimization	
677	17462	VON KARMAN AVE	44,430	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	468	19.99	18.66	205.27	Redev	Non-Res Optimization	
678	17510	VON KARMAN AVE	161	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	479	0.21	0.22	2.22	Redev	Non-Res Optimization	
678	17510	VON KARMAN AVE	11,466	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	479	14.91	15.82	157.89	Redev	Non-Res Optimization	
678	17510	VON KARMAN AVE	4,955	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	479	2.23	2.08	22.89	Redev	Non-Res Optimization	
679	17514	VON KARMAN AVE	283	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	479	0.37	0.39	3.90	Redev	Non-Res Optimization	
679	17514	VON KARMAN AVE	6,880	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	479	3.10	2.89	31.79	Redev	Non-Res Optimization	
680	17516	VON KARMAN AVE	2,436	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	479	3.17	3.36	33.54	Redev	Non-Res Optimization	
680	17516	VON KARMAN AVE	3,964	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	479	1.78	1.66	18.31	Redev	Non-Res Optimization	
681	17518	VON KARMAN AVE	2,739	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	479	3.56	3.78	37.72	Redev	Non-Res Optimization	
681	17518	VON KARMAN AVE	4,457	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	479	2.01	1.87	20.59	Redev	Non-Res Optimization	
682	17520	VON KARMAN AVE	2,202	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	479	2.86	3.04	30.32	Redev	Non-Res Optimization	
682	17520	VON KARMAN AVE	2,716	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	479	1.22	1.14	12.55	Redev	Non-Res Optimization	
683	17522	VON KARMAN AVE	218	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	479	0.28	0.30	3.00	Redev	Non-Res Optimization	
683	17522	VON KARMAN AVE	2,287	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	479	2.97	3.16	31.49	Redev	Non-Res Optimization	
683	17522	VON KARMAN AVE	4,361	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	479	1.96	1.83	20.15	Redev	Non-Res Optimization	
684	17524	VON KARMAN AVE	2,530	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	479	3.29	3.49	34.84	Redev	Non-Res Optimization	
684	17524	VON KARMAN AVE	4,118	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	479	1.85	1.73	19.03	Redev	Non-Res Optimization	
685	17526	VON KARMAN AVE	4,940	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	479	6.42	6.82	68.02	Redev	Non-Res Optimization	
685	17526	VON KARMAN AVE	4,118	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	479	1.85	1.73	19.03	Redev	Non-Res Optimization	
686	17528	VON KARMAN AVE	3,958	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	479	5.15	5.46	54.50	Redev	Non-Res Optimization	
686	17528	VON KARMAN AVE	6,442	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	479	2.90	2.71	29.76	Redev	Non-Res Optimization	
687	17530	VON KARMAN AVE	2,785	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	479	3.62	3.84	38.35	Redev	Non-Res Optimization	
687	17530	VON KARMAN AVE	4,531	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	479	2.04	1.90	20.93	Redev	Non-Res Optimization	
688	17532	VON KARMAN AVE	3,191	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	479	4.15	4.40	43.94	Redev	Non-Res Optimization	
688	17532	VON KARMAN AVE	5,193	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	479	2.34	2.18	23.99	Redev	Non-Res Optimization	
689	17534	VON KARMAN AVE	2,439	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	479	3.17	3.37	33.59	Redev	Non-Res Optimization	
689	17534	VON KARMAN AVE	3,969	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	479	1.79	1.67	18.34	Redev	Non-Res Optimization	
690	17536	VON KARMAN AVE	3,757	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	479	4.88	5.18	51.73	Redev	Non-Res Optimization	
690	17536	VON KARMAN AVE	6,115	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	479	2.75	2.57	28.25	Redev	Non-Res Optimization	
691	17400	VON KARMAN AVE	18,792	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	468	24.43	25.93	258.77	Fixed		in 2015
691	17400	VON KARMAN AVE	76,828	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	468	34.57	32.27	354.95	Fixed		in 2015
692	17875	VON KARMAN AVE	125,390	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	478	163.01	173.04	1,726.62	Redev	Non-Res Optimization	
693	17877	VON KARMAN AVE	153,619	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	478	199.70	211.99	2,115.33	Redev	Non-Res Optimization	
694	17900	VON KARMAN AVE	1,943	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	491	2.53	2.68	26.76	Redev	Res Potential	
694	17900	VON KARMAN AVE	64,980	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	491	84.47	89.67	894.77	Redev	Res Potential	
695	18000	VON KARMAN AVE	336,700	SF	Existing	11	Hotel	PA36	5.1	IBC Multi-Use	501	0.00	0.00	0.00	Fixed		in 2015
695	18000	VON KARMAN AVE	502	ROOM	Existing	111	HOTEL - ITAM	PA36	5.1	IBC Multi-Use	501	210.84	341.36	5,020.00	Fixed		in 2015
695	18400	VON KARMAN AVE	2,589	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	510	6.58	18.02	217.48	Fixed		in 2015
695	18420	VON KARMAN AVE	9,450	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	510	24.00	65.77	793.80	Fixed		in 2015

IBC Vision Plan Database Snap Shot As Of July 10, 2009

Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
695	18400	VON KARMAN AVE	1,454	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	510	1.89	2.01	20.02	Fixed		
695	18100	VON KARMAN AVE	2,022	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	510	2.63	2.79	27.84	Fixed		
695	18300	VON KARMAN AVE	216,289	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	510	281.18	298.48	2,978.30	Fixed		in 2015
695	18400	VON KARMAN AVE	221,192	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	510	287.55	305.24	3,045.81	Fixed		in 2015
695	18500	VON KARMAN AVE	225,992	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	510	293.79	311.87	3,111.91	Fixed		in 2015
695	18200	VON KARMAN AVE	226,739	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	510	294.76	312.90	3,122.20	Fixed		in 2015
695	18100	VON KARMAN AVE	236,273	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	510	307.15	326.06	3,253.48	Fixed		in 2015
696	18111	VON KARMAN AVE	1,767	SF	Discretionary Approval	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	498	4.49	12.30	148.43	Fixed		
696	18101	VON KARMAN AVE	2,000	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	498	5.08	13.92	168.00	Fixed		in 2015
696	18111	VON KARMAN AVE	2,233	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	498	5.67	15.54	187.57	Fixed		in 2015
696	18051	VON KARMAN AVE	12,100	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	498	30.73	84.22	1,016.40	Fixed		in 2015
696	18007	VON KARMAN AVE	89,940	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	498	228.45	625.98	7,554.96	Fixed		in 2015
696	18191	VON KARMAN AVE	1,071	SF	Discretionary Approval	121	Office	PA36	5.1	IBC Multi-Use	498	1.39	1.48	14.75	Fixed		
696	18101	VON KARMAN AVE	13,251	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	498	17.23	18.29	182.47	Fixed		
696	18191	VON KARMAN AVE	128,135	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	498	166.58	176.83	1,764.42	Fixed		in 2015
696	18171	VON KARMAN AVE	140,951	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	498	183.24	194.51	1,940.90	Fixed		
696	18111	VON KARMAN AVE	236,920	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	498	308.00	326.95	3,262.39	Fixed		in 2015
696	18101	VON KARMAN AVE	405,789	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	498	527.53	559.99	5,587.71	Fixed		in 2015
697	2211	MICHELSON DR	393	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	504	1.00	2.74	33.01	Fixed		in 2015
697	18201	VON KARMAN AVE	5,700	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	504	7.41	7.87	78.49	Fixed		
697	18401	VON KARMAN AVE	115,634	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	504	150.32	159.57	1,592.28	Fixed		in 2015
697	18201	VON KARMAN AVE	234,300	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	504	304.59	323.33	3,226.31	Fixed		in 2015
697	18301	VON KARMAN AVE	235,898	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	504	306.67	325.54	3,248.32	Fixed		in 2015
697	2211	MICHELSON DR	271,334	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	504	352.73	374.44	3,736.27	Fixed		in 2015
698	18522	VON KARMAN AVE	-42,753	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	518	-55.58	-59.00	-588.71	Fixed		
698	18522	VON KARMAN AVE	42,753	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	518	55.58	59.00	588.71	Fixed		
698	18522	VON KARMAN AVE	250,000	SF	Pending Approval	121	Office	PA36	5.1	IBC Multi-Use	518	325.00	345.00	3,442.50	Fixed		
699	18551	VON KARMAN AVE	74,633	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	520	97.02	102.99	1,027.70	Fixed		in 2015
700	18651	VON KARMAN AVE	8,962	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	521	11.65	12.37	123.41	Fixed		in 2015
700	18651	VON KARMAN AVE	28,767	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	521	37.40	39.70	396.12	Fixed		
700	18651	VON KARMAN AVE	63,252	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	521	28.46	26.57	292.22	Fixed		in 2015
701	18850	VON KARMAN AVE	1,224	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	533	1.59	1.69	16.85	Fixed		
701	18800	VON KARMAN AVE	19,065	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	533	24.78	26.31	262.53	Fixed		in 2015
701	18850	VON KARMAN AVE	25,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	533	32.50	34.50	344.25	Fixed		in 2015
701	18800	VON KARMAN AVE	525	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	533	0.24	0.22	2.43	Fixed		in 2015
701	18850	VON KARMAN AVE	668	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	533	0.30	0.28	3.09	Fixed		in 2015
702	18831	VON KARMAN AVE	82	DU	Pending Approval	102	Condominiums	PA36	5.1	IBC Multi-Use	526	41.00	42.64	516.60	Fixed		in 2015
702	18831	VON KARMAN AVE	3,000	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	526	7.62	20.88	252.00	Fixed		in 2015
702	18831	VON KARMAN AVE	65,858	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	526	85.62	90.88	906.86	Fixed		in 2015
703	18881	VON KARMAN AVE	8,850	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	534	22.48	61.60	743.40	Fixed		in 2015
703	18881	VON KARMAN AVE	769	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	534	1.00	1.06	10.59	Fixed		
703	18881	VON KARMAN AVE	406,025	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	534	527.83	560.31	5,590.96	Fixed		in 2015
703	18881	VON KARMAN AVE	1,665	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	534	0.75	0.70	7.69	Fixed		in 2015
704	2300	DUPONT DR	1	DU	Density Bonus/Discretionary Approval	102	Condominiums	PA36	5.3C	IBC Residential	526	0.50	0.52	6.30	Fixed		in 2015
704	2300	DUPONT DR	23	DU	Density Bonus/Permits Issued	102	Condominiums	PA36	5.3C	IBC Residential	526	11.50	11.96	144.90	Fixed		in 2015
704	2300	DUPONT DR	92	DU	Permits Issued	102	Condominiums	PA36	5.3C	IBC Residential	526	46.00	47.84	579.60	Fixed		in 2015
705	19100	VON KARMAN AVE	15,772	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	538	40.06	109.77	1,324.85	Fixed		in 2015
705	19100	VON KARMAN AVE	305,025	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	538	396.53	420.93	4,200.19	Fixed		in 2015
705	19100	VON KARMAN AVE	12,000	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	538	5.40	5.04	55.44	Fixed		in 2015
706	2815	WARNER AVE	1,669	SF	Existing	121	Office	PA36	5.2	IBC Industrial	406	2.17	2.30	22.98	Fixed		in 2015
706	2825	WARNER AVE	8,217	SF	Existing	121	Office	PA36	5.2	IBC Industrial	406	10.68	11.34	113.15	Fixed		in 2015
706	2825	WARNER AVE	57,481	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	406	74.73	79.32	791.51	Fixed		
706	2825	WARNER AVE	10,750	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	406	4.84	4.52	49.67	Fixed		in 2015
706	2815	WARNER AVE	118,331	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	406	53.25	49.70	546.69	Fixed		in 2015
707	3080	WARNER AVE	1	DU	Existing	103	Apartments	PA36	5.2	IBC Industrial	422	0.50	0.52	6.30	Fixed		in 2015
707	3080	WARNER AVE	460	SF	Existing	121	Office	PA36	5.2	IBC Industrial	422	0.60	0.63	6.33	Fixed		in 2015
707	3080	WARNER AVE	64,615	SF	Discretionary Approval	121	Office	PA36	5.2	IBC Industrial	422	84.00	89.17	889.75	Fixed		
707	3080	WARNER AVE	64,280	SF	Existing	161	Mini Warehouse	PA36	5.2	IBC Industrial	422	18.64	17.36	195.41	Fixed		in 2015
708	3125	WARNER AVE	708	SF	Existing	121	Office	PA36	5.2	IBC Industrial	419	0.92	0.98	9.75	Fixed		in 2015
708	3125	WARNER AVE	6,023	SF	Additional Zoning Potential	121	Office	PA36	5.2	IBC Industrial	419	7.83	8.31	82.94	Fixed		
708	3125	WARNER AVE	69,440	SF	Existing	123	Manufacturing	PA36	5.2	IBC Industrial	419	31.25	29.16	320.81	Fixed		in 2015
709	2621	WHITE RD	4,615	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	495	6.00	6.37	63.55	Redev	Res Potential	
709	2621	WHITE RD	13,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	495	16.90	17.94	179.01	Redev	Res Potential	
709	2621	WHITE RD	31,034	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	495	13.97	13.03	143.38	Redev	Res Potential	
710	2450	WHITE RD	6,399	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	496	8.32	8.83	88.11	Redev	Res Potential	
710	2450	WHITE RD	28,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	496	36.40	38.64	385.56	Redev	Res Potential	
710	2450	WHITE RD	76,780	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	496	34.55	32.25	354.72	Redev	Res Potential	
711	2500	WHITE RD	1,298	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	499	1.69	1.79	17.87	Redev	Res Potential	Assume 2-acre park site in this TAZ
711	2500	WHITE RD	12,665	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	499	16.46	17.48	174.40	Redev	Res Potential	Assume 2-acre park site in this TAZ
711	2500	WHITE RD	61,266	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	499	27.57	25.73	283.05	Redev	Res Potential	Assume 2-acre park site in this TAZ
712	2532	WHITE RD	1,538	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	499	2.00	2.12	21.18	Redev	Res Potential	Assume 2-acre park site in this TAZ
712	2532	WHITE RD	7,545	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	499	9.81	10.41	103.89	Redev	Res Potential	Assume 2-acre park site in this TAZ
712	2572	WHITE RD	12,000	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	499	15.60	16.56	165.24	Redev	Res Potential	Assume 2-acre park site in this TAZ
712	2552	WHITE RD	15,472	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	499	20.11	21.35	213.05	Redev	Res Potential	Assume 2-acre park site in this TAZ
712	2552	WHITE RD	3,623	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	499	1.63	1.52	16.74	Redev	Res Potential	Assume 2-acre park site in this TAZ
712	2532	WHITE RD	5,030	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	499	2.26	2.11	23.24	Redev	Res Potential	Assume 2-acre park site in this TAZ
713	2541	WHITE RD	15,624	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	495	20.31	21.56	215.14	Redev	Res Potential	
713	2541	WHITE RD	57,125	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	495	25.71	23.99	263.92	Redev	Res Potential	
714	2592	WHITE RD	16,312	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	499	41.43	113.53	1,370.21	Redev	Res Potential	Assume 2-acre park site in this TAZ
714	2592	WHITE RD	1,476	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	499	1.92	2.04	20.32	Redev	Res Potential	Assume 2-acre park site in this TAZ
714	2592	WHITE RD	15,138	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	499	19.68	20.89	208.45	Redev	Res Potential	Assume 2-acre park site in this TAZ
714	2592	WHITE RD	13,260	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	499	5.97	5.57	61.26	Redev	Res Potential	Assume 2-acre park site in this TAZ
715	2652	WHITE RD	8,072	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	499	10.49	11.14	111.15	Redev	Res Potential	Assume 2-acre park site in this TAZ

IBC Vision Plan Database Snap Shot As Of July 10, 2009

Project #	Address	Street	Quantity	Type	Status	Itam Code	Itam Code Desc	PA	Zon Code	Zoning Code Desc	Itam TAZ	AM Trips	PM Trips	ADT Trips	Plan	LU Assumption	Notes
715	2652	WHITE RD	31,158	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	499	14.02	13.09	143.95	Redev	Res Potential	Assume 2-acre park site in this TAZ
716	2698	WHITE RD	10,223	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	499	13.29	14.11	140.77	Redev	Res Potential	Assume 2-acre park site in this TAZ
716	2698	WHITE RD	5,775	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	499	2.60	2.43	26.68	Redev	Res Potential	Assume 2-acre park site in this TAZ
717	2699	WHITE RD	26,010	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	495	33.81	35.89	358.16	Redev	Res Potential	
718	2719	WHITE RD	3,816	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	495	4.96	5.27	52.55	Redev	Res Potential	
718	2719	WHITE RD	16,926	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	495	22.00	23.36	233.07	Redev	Res Potential	
718	2719	WHITE RD	4,240	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	495	1.91	1.78	19.59	Redev	Res Potential	
719	18802	BARDEEN AVE	26,196	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	539	34.05	36.15	360.72	Fixed		in 2015
720	3007	MAIN ST	1,440	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	474	1.87	1.99	19.83	Redev	Res Potential	
720	3007	MAIN ST	2,688	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	474	3.49	3.71	37.01	Redev	Res Potential	
720	3007	MAIN ST	760	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	474	0.34	0.32	3.51	Redev	Res Potential	
721	2130	SCHOLARSHIP	63	DU	Existing	102	Condominiums	PA36	5.3C	IBC Residential	544	31.50	32.76	396.90	Fixed		in 2015
721	2100	SCHOLARSHIP	154	DU	Existing	102	Condominiums	PA36	5.3C	IBC Residential	544	77.00	80.08	970.20	Fixed		in 2015
721	1102	SCHOLARSHIP	187	DU	Existing	102	Condominiums	PA36	5.3C	IBC Residential	544	93.50	97.24	1,178.10	Fixed		in 2015
723	5000	SCHOLARSHIP	101	DU	Existing	102	Condominiums	PA36	5	IBC Mixed-Use	544	50.50	52.52	636.30	Fixed		in 2015
723	8000	SCHOLARSHIP	101	DU	Existing	102	Condominiums	PA36	5	IBC Mixed-Use	544	50.50	52.52	636.30	Fixed		in 2015
723	7020	SCHOLARSHIP	3,343	SF	Existing	109	Commercial (EQ)	PA36	5	IBC Mixed-Use	544	8.49	23.27	280.81	Fixed		in 2015
723	7020	SCHOLARSHIP	266,088	SF	Additional Zoning Potential	121	Office	PA36	5	IBC Mixed-Use	544	345.91	367.20	3,664.03	Fixed		
724	6000	SCHOLARSHIP	8,000	SF	Existing	109	Commercial (EQ)	PA36	5	IBC Mixed-Use	544	20.32	55.68	672.00	Fixed		in 2015
725	3000	SCHOLARSHIP	105	DU	Existing	102	Condominiums	PA36	5	IBC Mixed-Use	544	52.50	54.60	661.50	Fixed		in 2015
726	2	WATERMARKE PL	535	DU	Existing	102	Condominiums	PA36	5.3A	IBC Residential	544	267.50	278.20	3,370.50	Fixed		in 2015
727	18831	BARDEEN AVE	34,785	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	538	45.22	48.00	478.99	Fixed		in 2015
728	2960	MAIN ST	34,757	SF	Existing	161	Mini Warehouse	PA36	5.1	IBC Multi-Use	503	5.91	9.04	90.72	Fixed		in 2015
728	2960	MAIN ST	0	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	509	0.00	0.00	0.00	Fixed		
728	2960	MAIN ST	64,547	SF	Existing	161	Mini Warehouse	PA36	5.1	IBC Multi-Use	509	10.97	16.78	168.47	Fixed		in 2015
729	18432	JAMBOREE RD	2,174	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	532	2.83	3.00	29.94	Fixed		
729	18432	JAMBOREE RD	100	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	532	0.05	0.04	0.46	Fixed		in 2015
730	2450	ALTON PKWY	14,402	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	456	18.72	19.87	198.32	Fixed		in 2015
730	2450	ALTON PKWY	7,700	SF	Existing	124	Warehouse	PA36	5.1	IBC Multi-Use	456	3.47	3.23	35.57	Fixed		in 2015
731	2500	ALTON PKWY	5,395	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	456	7.01	7.45	74.29	Fixed		
731	2500	ALTON PKWY	25,542	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	456	33.20	35.25	351.71	Fixed		in 2015
800	2525	MCGAW AVE	52,823	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	456	68.67	72.90	727.37	Fixed		in 2015
800	2525	MCGAW AVE	157,743	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	456	205.07	217.69	2,172.12	Fixed		
800	2525	MCGAW AVE	501,624	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	456	225.73	210.68	2,317.50	Fixed		in 2015
801	2740	ALTON PKWY	2,705	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	456	6.87	18.83	227.22	Fixed		in 2015
801	2730	ALTON PKWY	4,286	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	456	10.89	29.83	360.02	Fixed		in 2015
801	2710	ALTON PKWY	4,903	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	456	12.45	34.12	411.85	Fixed		in 2015
801	2750	ALTON PKWY	8,568	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	456	21.76	59.63	719.71	Fixed		in 2015
801	2600	ALTON PKWY	25,810	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	456	65.56	179.64	2,168.04	Fixed		in 2015
801	2700	ALTON PKWY	40,169	SF	Existing	109	Commercial (EQ)	PA36	5.1	IBC Multi-Use	456	102.03	279.58	3,374.20	Fixed		in 2015
801	2700	ALTON PKWY	75	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	456	0.10	0.10	1.03	Fixed		in 2015
801	2550	ALTON PKWY	26,482	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	456	34.43	36.55	364.66	Fixed		in 2015
801	2710	ALTON PKWY	26,647	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	456	34.64	36.77	366.93	Fixed		in 2015
802	2777	MCGAW AVE	21,460	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	456	27.90	29.61	295.50	Redev	Res Potential	
802	2777	MCGAW AVE	88,350	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	456	39.76	37.11	408.18	Redev	Res Potential	
803	2201	MARTIN	156	DU	Permits Issued	102	Condominiums	PA36	5.3A	IBC Residential	527	78.00	81.12	982.80	Fixed		in 2015
1001	17111	RED HILL AVE	25,688	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	399	33.39	35.45	353.72	Fixed		in 2015
1001	17111	RED HILL AVE	179,725	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	399	80.88	75.48	830.33	Fixed		in 2015
1003	1961	MCGAW AVE	1,254	SF	Additional Zoning Potential	121	Office	PA36	5.1	IBC Multi-Use	435	1.63	1.73	17.27	Fixed		
1003	1961	MCGAW AVE	3,678	SF	Existing	121	Office	PA36	5.1	IBC Multi-Use	435	4.78	5.08	50.65	Fixed		in 2015
1003	1961	MCGAW AVE	21,922	SF	Existing	123	Manufacturing	PA36	5.1	IBC Multi-Use	435	9.86	9.21	101.28	Fixed		in 2015
1023	2801	MAIN ST	290	DU	Existing	103	Apartments	PA36	5	IBC Mixed-Use	497	145.00	150.80	1,827.00	Fixed		in 2015
1023	2801	MAIN ST	7,500	SF	Existing	109	Commercial (EQ)	PA36	5	IBC Mixed-Use	497	19.05	52.20	630.00	Fixed		in 2015

IBC Vision Plan - Transfer of Development Rights Assumptions

Project Name	TAZ ID	Project #	Total Trip Budget (Existing)			Existing Land Use							Remaining Approval		Total Trip Budget (Project)			Project Acres	Fixed Land Use							Remaining Approval	
			AM	PM	ADT	Resid	Office	Retail	Indus	Hotel	Ext Stay Hotel	Office Equiv	Office	Indus	AM	PM	ADT		Resid	Office	Retail	Indus	Hotel	Ext Stay Hotel	Office Equiv	Office	Indus
Project Data for Pending Residential Projects requiring TDR																											
Martin Street Condos (Receiving Site)	526	702	93	112	1,159	0	68,858	3,000	0	0	0	0	0	0	134	155	1,676	3.66	82	68,858	3,000	0	0	0	0	0	0
*Campus Center (Sending Site)**	544	723	790	1,827	22,842	202	0	3,343	0	0	0	523,468	0	0	749	1,784	22,325	3.31	202	0	3,343	0	0	0	492,309	0	0
2851 Alton (Receiving Site)	464	19	57	56	592	0	12,700	0	66,100	0	0	8,093	0	0	86	89	920	3.72	170	0	0	0	0	0	0	0	0
*Campus Center (Sending Site)**	544	723	749	1,784	22,325	202	0	3,343	0	0	0	492,309	0	0	720	1751	22,325	3.31	202	0	3,343	0	0	0	470,001	0	0
ITC - Mixed Use (Receiving Site)	543 & 545	56, 97 & 98	446	539	5,652	0	170,975	24,825	53,768	0	0	67,108	0	0	633	790	9,213	18.84	1,000	44,000	30,000	0	0	0	0	0	0
*Campus Center (Sending Site)**	544	723	720	1,751	21,997	202	0	3,343	0	0	0	470,001	0	0	533	1,500	18,436	3.31	202	0	3,343	0	0	0	290,001	0	0
Avalon Jamboree - Phase II (Receiving Site)	446	334	42	42	437	0	8,326	0	40,649	0	0	9,746	0	0	73	75	766	2.8	144	0	0	0	0	0	0	0	0
*Campus Center (Sending Site)**	544	723	533	1,500	18,436	202	0	3,343	0	0	0	290,001	0	0	455	1,455	17,916	3.31	202	0	3,343	0	0	0	266,088	0	0
Park Avenue Apartments (Receiving Site)	446	530	37	38	389	0	15,922	0	24,566	0	0	4,084	0	0	63	66	668	2.53	126	0	0	0	0	0	0	0	0
2777 McGaw (Sending Site)	456	802	115	122	1,217	0	0	0	88,350	0	0	57,692	0	0	89	94	938	6.54	0	0	0	88,350	0	0	37,402	0	0
2852 Kelvin (Receiving Site)	492	363 & 364	50	54	531	0	15,900	0	13,398	0	0	18,147	0	0	83	88	764	3.2	166	0	0	0	0	0	0	0	0
2801 Kelvin (Sending Site)	485	361	160	170	1,699	248	0	0	0	0	0	9,920	0	0	149	158	1,699	5.26	248	0	0	0	0	0	1,458	0	0
2777 McGaw (Sending Site)	456	802	89	94	938	0	0	0	88,350	0	0	37,402	0	0	67	72	938	6.54	0	0	0	88,350	0	0	21,460	0	0
Kilroy (Receiving Site)	445 & 455	671	125	127	1,311	0	60,008	0	101,413	0	0	1,041	0	0	176	181	1,850	9.15	347	0	0	0	0	0	0	0	0
2555 Main (Sending Site)	490	428	331	355	3,972	481	0	0	0	0	0	69,231	0	0	282	294	3,465	9.9	481	0	0	0	0	0	31,539	0	0
Project Data for Pending Non-Residential Projects requiring a TDR																											
Element Hotel (Receiving Site)	465	49	22	22	234	0	6,000	0	23,400	0	0	3,152	0	0	59	61	627	1.52	0	0	0	0	0	122	0	0	0
17572 Armstrong (Sending Site)	460	43	109	115	1,151	0	0	0	20,500	0	0	76,710	0	0	72	76	758	1.82	0	0	0	20,500	0	0	48,170	0	0
Hines Master Plan (Receiving Site)	528 & 535	501 & 656	704	727	7,431	0	25,825	0	143,727	0	0	137,712	314,712	0	1,060	1,191	12,175	16	0	785,000	15,500	0	0	0	0	0	0
16651 Noyes (Sending Site)	431	592	23	25	248	0	8,000	0	6,317	0	0	7,506	0	0	14	16	152	0.89	0	8,000	0	6,317	0	0	919		
88 Corporate Park (Sending Site)	443	170	20	31	341	0	0	2,453	0	0	0	10,091	0	0	7	17	202	0.35	0	0	2,453	0	0	0	0		
1 Edwards Way (Sending Site)	404	2	787	830	8,325	0	75,496	0	100,026	0	0	30,908	463,980	1,795	657	692	6,948	15.99	0	75,496	0	100,026	0	0	0*	394,888	1,795
2555 Main (Sending Site)	490	428	409	528	5,608	481	0	0	0	0	0	129,231	0	0	331	355	3,972	9.9	481	0	0	0	0	0	69,231	0	0
18691 Jamboree (Sending Site)	535	339	709	753	9,085	0	0	0	0	0	0	545,385	0	0	583	623	7,589	7.5	0	0	0	0	0	0	451,182		
Project Data for Pending Non-Residential Projects - No TDR																											
Irvine Crossings Master Plan Modificaiton and TPM	462 & 478	476	365	380	3,853	0	4,726	0	196,300	0	0	34,615	173,774	0	365	380	3,853	21	0	4,726	0	196,300	0	0	34,615	173,774	0
Diamond Jamboree Master Plan Modification	456	801	268	642	7,629	0	26,647	86,441	0	0	0	75	0	0	302	679	7,994	28	0	26,647	86,441	0	0	0	26,632	0	0
Master Plan for GIFREHC Center	535	339	583	623	7,589	0	0	0	0	0	0	448,462	0	0	527	749	8,969	7.49	0	197,130	26,000	0	250	0	0	0	0
Allergan Master Plan Modification*	518	698	57	59	608	0	0	0	0	0	0	42,753	0	0	325	345	3,443	3.98	0	250,000	0	0	0	0	0	0	0
McGaw - Tentative Tract Map	415	296 & 458	29	29	304	0	13,338	0	26,072	0	0	0	0	0	29	29	304	0.28	0	13,338	0	26,072	0	0	0	0	0
Modification to CUP for Park Place	516	503	5,840	7,480	80,168	232	2,649,224	89,122	0	0	0	85,072	1,049,970	735	5,840	7,480	80,168	134	232	2,649,224	89,122	0	0	0	85,072	1,049,970	735
Alton - Tentative Parcel Map for Non-Residential Condos	440	1	82	81	856	0	10,270	0	111,310	0	0	14,512	0	0	82	81	856	5.3	0	10,270	0	111,310	0	0	14,512	0	0
Business Center - Tentative Parcel Map	502	82 & 83	42	44	442	0	32,100	0	0	0	0	0	0	0	42	44	442	2.04	0	32,100	0	0	0	0	0	0	0

IBC Vision Plan - Transfer of Development Rights Assumptions, Continued

Project Name	Fixed Trip Budget																					Remaining Approval						Fixed Acreage							Remaining Approval	
	Residential			Office			Retail			Industrial			Hotel			Extended Stay Hotel			Office Equivalency			Office			Industrial											
	AM	PM	ADT	AM	PM	ADT	AM	PM	ADT	AM	PM	ADT	AM	PM	ADT	AM	PM	ADT	AM	PM	ADT	AM	PM	ADT	AM	PM	ADT	Resid	Office	Retail	Indus	Hotel	Ext Stay Hotel	Office Equiv	Office	Indus
Project Data for Pending Residential Projects requiring TDR																																				
Martin Street Condos (Receiving Site)	41	43	517	86	91	907	7	21	252	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.02	1.64	0	0	0	0	0	0	0
*Campus Center (Sending Site)**	101	105	1,273	0	0	0	8	23	281	0	0	0	0	0	0	0	0	0	640	679	6,779	0	0	0	0	0	0	3.23	0	0.08	0	0	0	11.3	0	0
2851 Alton (Receiving Site)	86	89	920	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.72	0	0	0	0	0	0	0	0
*Campus Center (Sending Site)**	101	105	1,273	0	0	0	8	23	281	0	0	0	0	0	0	0	0	0	611	649	6,472	0	0	0	0	0	0	3.23	0	0.08	0	0	0	10.7	0	0
ITC - Mixed Use (Receiving Site)	500	520	6,300	57	61	606	76	209	2,520	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17.18	1.01	0.68	0	0	0	0	0	0
*Campus Center (Sending Site)**	101	105	1,273	0	0	0	8	23	281	0	0	0	0	0	0	0	0	0	377	400	3,993	0	0	0	0	0	0	3.23	0	0.08	0	0	0	6.6	0	0
Avalon Jamboree - Phase II (Receiving Site)	73	75	766	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.8	0	0	0	0	0	0	0	0
*Campus Center (Sending Site)**	101	105	1,273	0	0	0	8	23	281	0	0	0	0	0	0	0	0	0	346	367	3,664	0	0	0	0	0	0	3.23	0	0.08	0	0	0	6.1	0	0
Park Avenue Apartments (Receiving Site)	63	66	668	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.53	0	0	0	0	0	0	0	0
2777 McGaw (Sending Site)	0	0	0	0	0	0	0	0	0	40	37	408	0	0	0	0	0	0	49	52	515	0	0	0	0	0	0	0	0	0	2.02	0	0	0.8	0	0
2852 Kelvin (Receiving Site)	83	88	764	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3.2	0	0	0	0	0	0	0	0
2801 Kelvin (Sending Site)	124	129	1,562	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	20	0	0	0	0	0	0	5.26	0	0	0	0	0	0.03	0	0
2777 McGaw (Sending Site)	0	0	0	0	0	0	0	0	0	40	37	408	0	0	0	0	0	0	28	30	296	0	0	0	0	0	0	0	0	0	2.02	0	0	0.5	0	0
Kilroy (Receiving Site)	176	181	1,850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9.15	0	0	0	0	0	0	0	0
2555 Main (Sending Site)	241	250	3,030	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	41	44	434	0	0	0	0	0	0	7	0	0	0	0	0	0.72	0	0
Project Data for Pending Non-Residential Projects requiring a TDR																																				
Element Hotel (Receiving Site)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	61	627	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.52	0	0	0
17572 Armstrong (Sending Site)	0	0	0	0	0	0	0	0	0	9	9	95	0	0	0	0	0	0	63	66	663	0	0	0	0	0	0	0	0	0	0.47	0	0	1.1	0	0
Hines Master Plan (Receiving Site)	0	0	0	1,021	1,083	10,809	39	108	1,302	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	0.35	0	0	0	0	0	0
16651 Noyes (Sending Site)	0	0	0	20	56	672	0	0	0	3	3	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.18	0	0.14	0	0	0.02	0	0
88 Corporate Park (Sending Site)	0	0	0	0	0	0	6	17	206	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.05	0	0	0	0	0	0
1 Edwards Way (Sending Site)	0	0	0	98	104	1,040	0	0	0	45	42	462	0	0	0	0	0	0	513	545	5,438	513	545	5,438	1	1	8	0	1.7	0	2.3	0	0	0	9	0.04
2555 Main (Sending Site)	241	250	3,030	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	105	942	0	0	0	0	0	0	7	0	0	0	0	0	1.6	0	0
18691 Jamboree (Sending Site)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	583	623	6,213	0	0	0	0	0	0	0	0	0	0	0	0	10.35	0	0
Project Data for Pending Non-Residential Projects - No TDR																																				
Irvine Crossings Master Plan Modificaiton and TPM	0	0	0	6	7	65	0	0	0	88	82	907	0	0	0	0	0	0	45	48	477	226	240	2,393	0	0	0	0	0.09	0	4.5	0	0	0.79	3.9	0
Diamond Jamboree Master Plan Modification	0	0	0	35	37	367	220	602	7,261	0	0	0	0	0	0	0	0	0	35	37	367	0	0	0	0	0	0	0	0.6	1.9	0	0	0	0.6	0	0
Master Plan for GIFREHC Center	0	0	0	315	335	3,339	64	176	2,130	0	0	0	147	238	3,500	0	0	0	0	0	0	0	0	0	0	0	0	0	5.5	0.58	0	0.41	0	0	0	0
Allergan Master Plan Modification*	0	0	0	325	345	3,443	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5.7	0	0	0	0	0	0	0
McGaw - Tentative Tract Map	0	0	0	17	18	184	0	0	0	12	11	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0	0.59	0	0	0	0	0
Modification to CUP for Park Place	116	121	1,462	3,444	3,656	36,480	226	620	7,486	0	0	0	0	0	0	0	0	0	111	117	1,171	1,365	1,449	14,458	0	0	3	2.32	60.8	2	0	0	0	1.9	24.1	0.01
Alton - Tentative Parcel Map for Non-Residential Condos	0	0	0	13	14	141	0	0	0	50	47	514	0	0	0	0	0	0	19	20	200	0	0	0	0	0	0	0	0.23	0	2.5	0	0	0.33	0	0
Business Center - Tentative Parcel Map	0	0	0	42	44	442	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.04	0	0	0	0	0	0	0