Appendix E

Level of Service Calculation Worksheets

Background Conditions

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1185	72	45	978	149	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1600	1583	1770	1600	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1600	1583	1770	1600	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1288	78	49	1063	162	64
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1288	78	49	1063	162	64
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	80.1	80.1	3.4	87.2	13.4	13.4
Effective Green, g (s)	82.1	82.1	3.1	89.2	13.6	13.6
Actuated g/C Ratio	0.74	0.74	0.03	0.81	0.12	0.12
Clearance Time (s)	6.0	6.0	3.7	6.0	4.2	4.2
Vehicle Extension (s)	1.5	1.5	3.0	1.5	2.0	2.0
Lane Grp Cap (vph)	1186	1173	50	1288	217	194
v/s Ratio Prot	c0.81		0.03	c0.66	c0.09	
v/s Ratio Perm		0.05				0.04
v/c Ratio	1.09	0.07	0.98	0.83	0.75	0.33
Uniform Delay, d1	14.4	3.9	53.8	6.3	46.9	44.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	52.8	0.0	118.5	4.2	11.5	0.4
Delay (s)	67.1	3.9	172.3	10.5	58.5	44.8
Level of Service	E	A	F	B	E	D
Approach Delay (s)	63.5			17.6	54.6	
Approach LOS	E			B	D	

Intersection Summary

HCM Average Control Delay	43.9	HCM Level of Service	D
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	110.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	141	1078	25	95	886	243	71	31	77	96	26	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.94			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.96	1.00
Satd. Flow (prot)	1770	1600	1553	1703	1600	1583		1714			1785	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.71			0.55	1.00
Satd. Flow (perm)	1770	1863	1553	1703	1863	1583		1236			1014	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	153	1172	27	103	963	264	77	34	84	104	28	73
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	153	1172	27	103	963	264	0	195	0	0	132	73
Heavy Vehicles (%)	2%	2%	4%	6%	2%	2%	3%	2%	2%	2%	4%	2%
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	12.2	72.7	72.7	8.0	68.5	68.5		20.9			20.9	20.9
Effective Green, g (s)	11.7	74.7	74.7	7.5	70.5	70.5		20.9			20.9	20.9
Actuated g/C Ratio	0.10	0.65	0.65	0.07	0.61	0.61		0.18			0.18	0.18
Clearance Time (s)	3.5	6.0	6.0	3.5	6.0	6.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	180	1038	1008	111	980	970		224			184	287
v/s Ratio Prot	c0.09	c0.73		0.06	0.60							
v/s Ratio Perm			0.02			0.17		c0.16			0.13	0.05
v/c Ratio	0.85	1.13	0.03	0.93	0.98	0.27		0.87			0.72	0.25
Uniform Delay, d1	50.8	20.2	7.2	53.5	21.7	10.4		45.8			44.3	40.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	29.4	70.6	0.0	62.3	24.9	0.7		28.7			12.5	0.5
Delay (s)	80.2	90.8	7.3	115.8	46.6	11.1		74.5			56.8	40.9
Level of Service	F	F	A	F	D	B		E			E	D
Approach Delay (s)		87.9			44.9			74.5			51.2	
Approach LOS		F			D			E			D	

Intersection Summary

HCM Average Control Delay	66.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	115.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	147	1093	11	17	1016	431	14	11	25	494	21	196
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		0.97	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3200		1770	3200	1568	1770	1669		3433	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3200		1770	3200	1568	1770	1669		3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	160	1188	12	18	1104	468	15	12	27	537	23	213
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	160	1200	0	18	1104	468	15	39	0	537	23	213
Heavy Vehicles (%)	2%	2%	2%	2%	4%	3%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot		pm+ov	Split			Split		Perm
Protected Phases	5	2		1	6	7	8	8		7	7	
Permitted Phases						6						7
Actuated Green, G (s)	8.2	37.5		0.7	30.0	46.2	2.2	2.2		16.2	16.2	16.2
Effective Green, g (s)	8.4	39.5		0.9	32.0	48.8	2.4	2.4		17.5	17.5	17.5
Actuated g/C Ratio	0.11	0.52		0.01	0.42	0.64	0.03	0.03		0.23	0.23	0.23
Clearance Time (s)	4.2	6.0		4.2	6.0	5.3	4.2	4.2		5.3	5.3	5.3
Vehicle Extension (s)	2.5	2.5		3.0	2.5	2.5	2.0	2.0		2.5	2.5	2.5
Lane Grp Cap (vph)	195	1657		21	1342	1003	56	52		787	427	363
v/s Ratio Prot	c0.09	0.38		0.01	c0.34	0.11	0.01	c0.02		c0.16	0.01	
v/s Ratio Perm						0.19						0.13
v/c Ratio	0.82	0.72		0.86	0.82	0.47	0.27	0.75		0.68	0.05	0.59
Uniform Delay, d1	33.2	14.2		37.6	19.6	7.1	36.1	36.7		26.9	22.9	26.2
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	22.9	1.5		129.6	4.1	0.3	0.9	41.1		2.2	0.0	2.0
Delay (s)	56.1	15.7		167.2	23.8	7.3	37.0	77.7		29.1	23.0	28.2
Level of Service	E	B		F	C	A	D	E		C	C	C
Approach Delay (s)		20.4			20.5			66.4			28.7	
Approach LOS		C			C			E			C	

Intersection Summary

HCM Average Control Delay	22.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	76.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	606	1006	1289	10	0	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0			4.0
Lane Util. Factor	1.00	0.95	0.95			0.88
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	1600	3200			2760
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1770	1600	3200			2760
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	659	1093	1401	11	0	190
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	659	1093	1412	0	0	190
Heavy Vehicles (%)	2%	2%	3%	2%	2%	3%
Turn Type	Prot					Over
Protected Phases	5	2	6			5
Permitted Phases						
Actuated Green, G (s)	31.3	79.6	37.7			31.3
Effective Green, g (s)	31.9	79.6	39.7			31.9
Actuated g/C Ratio	0.40	1.00	0.50			0.40
Clearance Time (s)	4.6	2.0	6.0			4.6
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	709	1600	1596			1106
v/s Ratio Prot	c0.37	0.68	c0.44			0.07
v/s Ratio Perm						
v/c Ratio	0.93	0.68	0.88			0.17
Uniform Delay, d1	22.8	0.0	17.9			15.3
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	18.5	1.2	6.2			0.1
Delay (s)	41.2	1.2	24.1			15.4
Level of Service	D	A	C			B
Approach Delay (s)		16.3	24.1		15.4	
Approach LOS		B	C		B	

Intersection Summary

HCM Average Control Delay	19.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	79.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	253	751	3	2	1152	394	9	2	5	113	1	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1600	1583	1770	1600	1583	1770	1663		3433	1863	1568
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1600	1583	1770	1600	1583	1770	1663		3433	1863	1568
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	275	816	3	2	1252	428	10	2	5	123	1	151
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	275	816	3	2	1252	428	10	7	0	123	1	151
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	3%
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6						4
Actuated Green, G (s)	17.8	111.3	111.3	0.8	94.1	94.1	1.5	3.1		16.7	17.9	17.9
Effective Green, g (s)	18.0	113.3	113.3	0.8	96.1	96.1	1.7	3.1		16.7	18.1	18.1
Actuated g/C Ratio	0.12	0.76	0.76	0.01	0.64	0.64	0.01	0.02		0.11	0.12	0.12
Clearance Time (s)	4.2	6.0	6.0	4.0	6.0	6.0	4.2	4.0		4.0	4.2	4.2
Vehicle Extension (s)	4.5	4.5	4.5	3.0	4.5	4.5	4.5	3.0		3.0	3.5	3.5
Lane Grp Cap (vph)	213	1209	1196	9	1026	1015	20	34		382	225	189
v/s Ratio Prot	c0.16	0.51		0.00	c0.78		0.01	0.00		c0.04	0.00	
v/s Ratio Perm			0.00			0.27						c0.10
v/c Ratio	1.29	0.67	0.00	0.22	1.22	0.42	0.50	0.21		0.32	0.00	0.80
Uniform Delay, d1	66.0	9.1	4.5	74.2	26.9	13.2	73.7	72.2		61.4	58.0	64.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	161.4	1.8	0.0	12.1	108.0	0.5	30.2	3.0		0.5	0.0	21.1
Delay (s)	227.4	10.9	4.5	86.4	134.9	13.7	103.8	75.2		61.9	58.0	85.2
Level of Service	F	B	A	F	F	B	F	E		E	E	F
Approach Delay (s)		65.3			104.0			92.0			74.7	
Approach LOS		E			F			F			E	

Intersection Summary

HCM Average Control Delay	87.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	149.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	94.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	791	46	21	1419	32	51	2	28	29	1	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98	1.00	0.98			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1770	1600	1583	1770	1600	1545	1770	1567			1772	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.74	1.00			0.73	1.00
Satd. Flow (perm)	1770	1600	1583	1770	1600	1545	1370	1567			1348	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	860	50	23	1542	35	55	2	30	32	1	84
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	35	860	50	23	1542	35	55	32	0	0	33	84
Confl. Peds. (#/hr)				1		1			1	1		
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	3.1	107.5	107.5	3.8	108.2	108.2	12.5	12.5			12.5	12.5
Effective Green, g (s)	2.8	109.5	109.5	3.5	110.2	110.2	12.6	12.6			12.6	12.6
Actuated g/C Ratio	0.02	0.80	0.80	0.03	0.80	0.80	0.09	0.09			0.09	0.09
Clearance Time (s)	3.7	6.0	6.0	3.7	6.0	6.0	4.1	4.1			4.1	4.1
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	36	1273	1260	45	1281	1237	125	143			123	145
v/s Ratio Prot	c0.02	0.54		0.01	c0.96			0.02				
v/s Ratio Perm			0.03			0.02	0.04				0.02	c0.05
v/c Ratio	0.97	0.68	0.04	0.51	1.20	0.03	0.44	0.22			0.27	0.58
Uniform Delay, d1	67.4	6.2	3.0	66.2	13.7	2.8	59.2	58.0			58.2	60.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	138.2	1.6	0.0	9.5	99.3	0.0	2.5	0.8			1.2	5.5
Delay (s)	205.6	7.8	3.0	75.7	113.0	2.8	61.6	58.8			59.4	65.5
Level of Service	F	A	A	E	F	A	E	E			E	E
Approach Delay (s)		14.8			110.1			60.6			63.8	
Approach LOS		B			F			E			E	

Intersection Summary

HCM Average Control Delay	73.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	137.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	93.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	722	136	237	1266	206	245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.97	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1600	1583	3433	1600	1770	1546
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1600	1583	3433	1600	1770	1546
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	785	148	258	1376	224	266
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	785	148	258	1376	224	266
Confl. Peds. (#/hr)			1		1	1
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	75.5	75.5	11.8	91.0	19.3	19.3
Effective Green, g (s)	77.5	77.5	11.5	93.0	19.0	19.0
Actuated g/C Ratio	0.65	0.65	0.10	0.78	0.16	0.16
Clearance Time (s)	6.0	6.0	3.7	6.0	3.7	3.7
Vehicle Extension (s)	2.5	2.5	2.5	2.5	3.0	3.0
Lane Grp Cap (vph)	1033	1022	329	1240	280	245
v/s Ratio Prot	0.49		0.08	c0.86	0.13	
v/s Ratio Perm		0.09				c0.17
v/c Ratio	0.76	0.14	0.78	1.11	0.80	1.09
Uniform Delay, d1	14.8	8.3	53.0	13.5	48.7	50.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.1	0.0	11.2	61.2	15.0	82.2
Delay (s)	17.9	8.4	64.2	74.7	63.7	132.7
Level of Service	B	A	E	E	E	F
Approach Delay (s)	16.4			73.0	101.2	
Approach LOS	B			E	F	

Intersection Summary

HCM Average Control Delay	60.3	HCM Level of Service	E
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	84.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	918	56	88	1343	13	160	1	199	8	1	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.96	1.00
Satd. Flow (prot)	1770	1600	1583	3400	1600			1757	1583		1783	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.96	1.00
Satd. Flow (perm)	1770	1600	1583	3400	1600			1757	1583		1783	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	998	61	96	1460	14	174	1	216	9	1	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	2	998	61	96	1474	0	0	175	216	0	10	5
Heavy Vehicles (%)	2%	2%	2%	3%	2%	2%	3%	2%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Split		Perm	Split		Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	1.0	92.1	92.1	7.4	98.2			29.8	29.8		3.0	3.0
Effective Green, g (s)	1.0	94.1	94.1	7.1	100.2			29.8	29.8		3.0	3.0
Actuated g/C Ratio	0.01	0.63	0.63	0.05	0.67			0.20	0.20		0.02	0.02
Clearance Time (s)	4.0	6.0	6.0	3.7	6.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	2.5	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	12	1004	993	161	1069			349	314		36	32
v/s Ratio Prot	0.00	0.62		c0.03	c0.92			0.10			c0.01	
v/s Ratio Perm			0.04						c0.14			0.00
v/c Ratio	0.17	0.99	0.06	0.60	1.38			0.50	0.69		0.28	0.16
Uniform Delay, d1	74.1	27.7	10.8	70.0	24.9			53.5	55.8		72.4	72.3
Progression Factor	1.00	1.00	1.00	0.98	1.34			1.00	1.00		1.00	1.00
Incremental Delay, d2	6.5	27.0	0.1	0.5	171.0			1.1	6.1		4.2	2.3
Delay (s)	80.6	54.7	11.0	69.3	204.4			54.6	61.9		76.6	74.5
Level of Service	F	D	B	E	F			D	E		E	E
Approach Delay (s)		52.2			196.2			58.7			75.9	
Approach LOS		D			F			E			E	

Intersection Summary

HCM Average Control Delay	127.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	93.7%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	1059	36	70	1320	1	111	1	143	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00			1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	0.97		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.98	1.00
Satd. Flow (prot)	1770	1600	1583	3273	1600			1775	1542		1817	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.98	1.00
Satd. Flow (perm)	1770	1600	1583	3273	1600			1775	1542		1817	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	1151	39	76	1435	1	121	1	155	1	1	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	1	1151	39	76	1436	0	0	122	155	0	2	1
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	2%	2%	7%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Split		Perm	Split		Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases			2						3			4
Actuated Green, G (s)	1.2	105.1	105.1	10.2	114.1			12.3	12.3		5.3	5.3
Effective Green, g (s)	0.9	107.1	107.1	9.9	116.1			12.0	12.0		5.0	5.0
Actuated g/C Ratio	0.01	0.71	0.71	0.07	0.77			0.08	0.08		0.03	0.03
Clearance Time (s)	3.7	6.0	6.0	3.7	6.0			3.7	3.7		3.7	3.7
Vehicle Extension (s)	3.0	3.0	3.0	2.5	3.0			2.5	2.5		2.5	2.5
Lane Grp Cap (vph)	11	1142	1130	216	1238			142	123		61	53
v/s Ratio Prot	0.00	0.72		c0.02	c0.90			0.07			c0.00	
v/s Ratio Perm			0.02						c0.10			0.00
v/c Ratio	0.09	1.01	0.03	0.35	1.16			0.86	1.26		0.03	0.02
Uniform Delay, d1	74.1	21.5	6.3	67.0	17.0			68.2	69.0		70.2	70.1
Progression Factor	0.85	1.15	1.35	1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	1.4	18.6	0.0	0.7	81.3			36.7	166.8		0.2	0.1
Delay (s)	64.1	43.3	8.5	67.7	98.3			104.9	235.8		70.3	70.2
Level of Service	E	D	A	E	F			F	F		E	E
Approach Delay (s)		42.2			96.7			178.2			70.3	
Approach LOS		D			F			F			E	

Intersection Summary

HCM Average Control Delay	82.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	89.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	27	0	2	227	99	7
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.61	0.61	0.83	0.83	0.59	0.59
Hourly flow rate (vph)	44	0	2	273	168	12
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					621	
pX, platoon unblocked						
vC, conflicting volume	452	174	180			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	452	174	180			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	100	100			
cM capacity (veh/h)	564	870	1396			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	44	276	180
Volume Left	44	2	0
Volume Right	0	0	12
cSH	564	1396	1700
Volume to Capacity	0.08	0.00	0.11
Queue Length 95th (ft)	6	0	0
Control Delay (s)	11.9	0.1	0.0
Lane LOS	B	A	
Approach Delay (s)	11.9	0.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	23.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	17	1185	1032	6	1	359
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.88	0.88	0.91	0.91	0.70	0.70
Hourly flow rate (vph)	19	1347	1134	7	1	513
Pedestrians		1	1		1	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1142				2521	1136
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1142				2521	1136
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				95	0
cM capacity (veh/h)	611				30	245

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	19	1347	1134	7	1	513
Volume Left	19	0	0	0	1	0
Volume Right	0	0	0	7	0	513
cSH	611	1700	1700	1700	30	245
Volume to Capacity	0.03	0.79	0.67	0.00	0.05	2.09
Queue Length 95th (ft)	2	0	0	0	4	961
Control Delay (s)	11.1	0.0	0.0	0.0	132.2	536.6
Lane LOS	B				F	F
Approach Delay (s)	0.2		0.0		535.5	
Approach LOS					F	

Intersection Summary			
Average Delay	91.2		
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		

12: Hwy 68 EB Ramps & Portola Dr.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	27	0	0	0	9	7	2	0	0	20	2	226
Peak Hour Factor	0.68	0.68	0.68	0.44	0.44	0.44	0.50	0.50	0.50	0.83	0.83	0.83
Hourly flow rate (vph)	40	0	0	0	20	16	4	0	0	24	2	272

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	40	36	4	0	24	275
Volume Left (vph)	40	0	4	0	24	0
Volume Right (vph)	0	16	0	0	0	272
Hadj (s)	0.27	-0.23	0.53	0.00	0.58	-0.66
Departure Headway (s)	4.8	4.4	5.4	4.9	5.3	4.0
Degree Utilization, x	0.05	0.04	0.01	0.00	0.04	0.31
Capacity (veh/h)	692	764	642	731	663	874
Control Delay (s)	8.1	7.6	7.3	6.7	7.3	7.6
Approach Delay (s)	8.1	7.6	7.3		7.6	
Approach LOS	A	A	A		A	

Intersection Summary			
Delay	7.6		
HCM Level of Service	A		
Intersection Capacity Utilization	28.9%	ICU Level of Service	A
Analysis Period (min)	15		

13: Hwy 68 WB Ramps & Portola Dr.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	31	12	42	359	5	14	18	203	11	3	28	3
Peak Hour Factor	0.82	0.82	0.82	0.75	0.75	0.75	0.82	0.82	0.82	0.70	0.70	0.70
Hourly flow rate (vph)	38	15	51	479	7	19	22	248	13	4	40	4

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	104	504	22	261	4	44
Volume Left (vph)	38	479	22	0	4	0
Volume Right (vph)	51	19	0	13	0	4
Hadj (s)	-0.19	0.20	0.60	0.00	0.53	0.00
Departure Headway (s)	5.5	5.3	6.9	6.3	7.3	6.8
Degree Utilization, x	0.16	0.74	0.04	0.46	0.01	0.08
Capacity (veh/h)	589	665	490	539	433	465
Control Delay (s)	9.6	21.7	9.0	13.3	9.2	9.2
Approach Delay (s)	9.6	21.7	12.9		9.2	
Approach LOS	A	C	B		A	

Intersection Summary			
Delay	17.1		
HCM Level of Service	C		
Intersection Capacity Utilization	45.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	239	341	0	0	330	455	125	1	77	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0	4.0			
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00	0.99			
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1770	1792			1845	1583		1771	1562			
Flt Permitted	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	1770	1792			1845	1583		1771	1562			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	260	371	0	0	359	495	136	1	84	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	260	371	0	0	359	495	0	137	84	0	0	0
Confl. Peds. (#/hr)			1	1			1		1			
Heavy Vehicles (%)	2%	6%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	5	2			6			8				
Permitted Phases						6	8		8			
Actuated Green, G (s)	17.7	68.2			46.8	46.8		12.3	12.3			
Effective Green, g (s)	17.4	70.2			48.8	48.8		13.2	13.2			
Actuated g/C Ratio	0.19	0.77			0.53	0.53		0.14	0.14			
Clearance Time (s)	3.7	6.0			6.0	6.0		4.9	4.9			
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	337	1376			985	845		256	226			
v/s Ratio Prot	c0.15	0.21			0.19							
v/s Ratio Perm						c0.31		0.08	0.05			
v/c Ratio	0.77	0.27			0.36	0.59		0.54	0.37			
Uniform Delay, d1	35.1	3.1			12.3	14.4		36.3	35.4			
Progression Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2	10.4	0.5			0.2	1.0		2.1	1.0			
Delay (s)	45.6	3.6			12.6	15.5		38.4	36.4			
Level of Service	D	A			B	B		D	D			
Approach Delay (s)		20.9			14.3			37.6			0.0	
Approach LOS		C			B			D			A	

Intersection Summary

HCM Average Control Delay	19.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	91.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	426	98	129	325	0	0	0	0	154	6	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0						4.0	4.0
Lane Util. Factor		1.00		1.00	1.00						1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00						1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00						1.00	1.00
Frt		0.97		1.00	1.00						1.00	0.85
Flt Protected		1.00		0.95	1.00						0.95	1.00
Satd. Flow (prot)		1757		1770	1845						1742	1524
Flt Permitted		1.00		0.95	1.00						0.95	1.00
Satd. Flow (perm)		1757		1770	1845						1742	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	463	107	140	353	0	0	0	0	167	7	174
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	570	0	140	353	0	0	0	0	0	174	174
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	5%	7%	2%	3%	2%	2%	2%	2%	4%	2%	6%
Turn Type				Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases										4		4
Actuated Green, G (s)		21.4		5.4	30.5						19.3	19.3
Effective Green, g (s)		23.4		5.1	32.5						20.2	20.2
Actuated g/C Ratio		0.39		0.08	0.54						0.33	0.33
Clearance Time (s)		6.0		3.7	6.0						4.9	4.9
Vehicle Extension (s)		3.0		3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		677		149	988						580	507
v/s Ratio Prot		c0.32		c0.08	0.19							
v/s Ratio Perm											0.10	c0.11
v/c Ratio		0.84		0.94	0.36						0.30	0.34
Uniform Delay, d1		17.0		27.6	8.1						15.0	15.3
Progression Factor		1.00		1.00	1.00						1.00	1.00
Incremental Delay, d2		9.3		55.1	1.0						1.3	1.8
Delay (s)		26.3		82.8	9.1						16.3	17.1
Level of Service		C		F	A						B	B
Approach Delay (s)		26.3			30.0			0.0			16.7	
Approach LOS		C			C			A			B	

Intersection Summary

HCM Average Control Delay	25.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	60.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	353	0	0	0	0	0	95	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	384	0	0	0	0	0	103	1	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0			0			769	767	0	767	767	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			0			769	767	0	767	767	0
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	100			76			100	100	100	59	100	100
cM capacity (veh/h)	1623			1617			259	253	1085	255	253	1085

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	0	384	105
Volume Left	0	384	103
Volume Right	0	0	1
cSH	1700	1617	257
Volume to Capacity	0.00	0.24	0.41
Queue Length 95th (ft)	0	23	48
Control Delay (s)	0.0	7.9	28.5
Lane LOS		A	D
Approach Delay (s)	0.0	7.9	28.5
Approach LOS			D

Intersection Summary			
Average Delay	12.4		
Intersection Capacity Utilization	31.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	95	0	0	353	0	329
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	103	0	0	384	0	358
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			103		487	103
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			103		487	103
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	62
cM capacity (veh/h)			1489		540	946

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	103	384	0	358
Volume Left	0	0	0	0
Volume Right	0	0	0	358
cSH	1700	1700	1700	946
Volume to Capacity	0.06	0.23	0.00	0.38
Queue Length 95th (ft)	0	0	0	44
Control Delay (s)	0.0	0.0	0.0	11.1
Lane LOS			A	B
Approach Delay (s)	0.0	0.0	11.1	
Approach LOS			B	

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	32.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	4	420	353	83	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	457	384	90	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						3
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	474				849	384
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	474				849	384
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	100
cM capacity (veh/h)	1088				330	664

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	4	457	384	90	0
Volume Left	4	0	0	0	0
Volume Right	0	0	0	90	0
cSH	1088	1700	1700	1700	1700
Volume to Capacity	0.00	0.27	0.23	0.05	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	8.3	0.0	0.0	0.0	0.0
Lane LOS	A				A
Approach Delay (s)	0.1		0.0		0.0
Approach LOS					A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	25.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	305	666	203	452	462	78	240	867	616	107	618	231
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	5.3
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3455		1770	3539	1583	1770	3539	1561
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3455		1770	3539	1583	1770	3539	1561
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	332	724	221	491	502	85	261	942	670	116	672	251
RTOR Reduction (vph)	0	0	96	0	12	0	0	0	217	0	0	179
Lane Group Flow (vph)	332	724	125	491	575	0	261	942	453	116	672	72
Confl. Peds. (#/hr)	2					2				2		2
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	14.2	26.3	26.3	17.9	30.0		18.8	41.8	41.8	9.3	32.3	32.3
Effective Green, g (s)	13.9	27.6	27.6	17.6	31.3		18.5	43.1	43.1	9.0	33.6	32.3
Actuated g/C Ratio	0.12	0.24	0.24	0.16	0.28		0.16	0.38	0.38	0.08	0.30	0.29
Clearance Time (s)	3.7	5.3	5.3	3.7	5.3		3.7	5.3	5.3	3.7	5.3	5.3
Vehicle Extension (s)	3.0	3.5	3.5	3.0	3.5		3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	421	862	386	533	954		289	1346	602	141	1050	445
v/s Ratio Prot	0.10	c0.20		c0.14	c0.17		c0.15	0.27		0.07	0.19	
v/s Ratio Perm			0.08						c0.29			0.05
v/c Ratio	0.79	0.84	0.32	0.92	0.60		0.90	0.70	0.75	0.82	0.64	0.16
Uniform Delay, d1	48.3	40.7	35.2	47.2	35.6		46.5	29.6	30.5	51.4	34.6	30.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.5	7.4	0.6	21.5	1.1		29.2	3.0	8.5	30.5	3.0	0.8
Delay (s)	57.7	48.2	35.8	68.6	36.7		75.7	32.7	38.9	81.9	37.6	31.1
Level of Service	E	D	D	E	D		E	C	D	F	D	C
Approach Delay (s)		48.5			51.3			40.9			41.0	
Approach LOS		D			D			D			D	

Intersection Summary

HCM Average Control Delay	44.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	113.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	83.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	568	313	0	0	373	151	1	5	7	157	1	432
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	617	340	0	0	405	164	1	5	8	171	1	470
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												4
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	570			340			1981	2145	340	2073	2062	488
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	570			340			1981	2145	340	2073	2062	488
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	38			100			75	71	99	0	95	19
cM capacity (veh/h)	998			1219			4	19	702	16	21	580

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	617	340	0	570	14	641
Volume Left	617	0	0	0	1	171
Volume Right	0	0	0	164	8	470
cSH	998	1700	1700	1700	25	55
Volume to Capacity	0.62	0.20	0.00	0.34	0.56	11.70
Queue Length 95th (ft)	111	0	0	0	43	Err
Control Delay (s)	14.3	0.0	0.0	0.0	261.4	Err
Lane LOS	B				F	F
Approach Delay (s)	9.2		0.0		261.4	Err
Approach LOS					F	F

Intersection Summary				
Average Delay	2943.7			
Intersection Capacity Utilization	85.7%	ICU Level of Service	E	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	469	537	19	136	610	213	24	524	221	176	447	761
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3518		1770	3539	1562	1770	3367		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3518		1770	3539	1562	1770	3367		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	510	584	21	148	663	232	26	570	240	191	486	827
RTOR Reduction (vph)	0	0	0	0	0	177	0	0	0	0	0	251
Lane Group Flow (vph)	510	605	0	148	663	55	26	810	0	191	486	576
Confl. Peds. (#/hr)			1	2		1	1		2	1		
Turn Type	Prot			Prot		Perm	Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6						4
Actuated Green, G (s)	14.2	24.0		9.9	19.2	19.2	1.8	23.1		12.6	34.4	34.4
Effective Green, g (s)	14.7	26.5		9.4	21.2	21.2	1.3	25.6		12.1	36.4	36.4
Actuated g/C Ratio	0.16	0.30		0.10	0.24	0.24	0.01	0.29		0.14	0.41	0.41
Clearance Time (s)	4.5	6.5		3.5	6.0	6.0	3.5	6.5		3.5	6.0	6.0
Vehicle Extension (s)	1.0	4.5		1.0	4.5	4.5	1.0	4.5		1.0	4.5	4.5
Lane Grp Cap (vph)	563	1040		186	837	370	26	962		239	757	643
v/s Ratio Prot	c0.15	0.17		0.08	c0.19		0.01	c0.24		0.11	0.26	
v/s Ratio Perm						0.04						c0.36
v/c Ratio	0.91	0.58		0.80	0.79	0.15	1.00	0.84		0.80	0.64	0.90
Uniform Delay, d1	36.8	26.8		39.2	32.1	27.1	44.1	30.1		37.6	21.4	24.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	17.8	2.4		19.3	7.6	0.8	176.5	7.3		15.8	2.3	15.7
Delay (s)	54.5	29.2		58.5	39.7	27.9	220.7	37.4		53.4	23.7	40.6
Level of Service	D	C		E	D	C	F	D		D	C	D
Approach Delay (s)		40.8			39.7			43.1			36.7	
Approach LOS		D			D			D			D	

Intersection Summary

HCM Average Control Delay	39.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	89.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	713	48	43	1459	71	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1600	1583	1770	1600	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1600	1583	1770	1600	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	775	52	47	1586	77	90
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	775	52	47	1586	77	90
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	86.9	86.9	6.7	97.3	10.8	10.8
Effective Green, g (s)	88.9	88.9	6.4	99.3	11.0	11.0
Actuated g/C Ratio	0.75	0.75	0.05	0.84	0.09	0.09
Clearance Time (s)	6.0	6.0	3.7	6.0	4.2	4.2
Vehicle Extension (s)	1.5	1.5	3.0	1.5	2.0	2.0
Lane Grp Cap (vph)	1202	1190	96	1343	165	147
v/s Ratio Prot	0.48		0.03	c0.99	0.04	
v/s Ratio Perm		0.03				c0.06
v/c Ratio	0.64	0.04	0.49	1.18	0.47	0.61
Uniform Delay, d1	7.1	3.8	54.4	9.5	50.9	51.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.9	0.0	3.9	89.4	0.8	5.2
Delay (s)	8.0	3.8	58.3	98.9	51.6	56.8
Level of Service	A	A	E	F	D	E
Approach Delay (s)	7.7			97.7	54.4	
Approach LOS	A			F	D	

Intersection Summary

HCM Average Control Delay	66.6	HCM Level of Service	E
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	118.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	691	19	54	1251	168	32	33	138	248	42	219
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.91			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.96	1.00
Satd. Flow (prot)	1770	1600	1583	1770	1600	1583		1679			1786	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.89			0.54	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1508			1001	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	751	21	59	1360	183	35	36	150	270	46	238
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	92	751	21	59	1360	183	0	221	0	0	316	238
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	4.5	40.0	40.0	3.2	38.7	38.7		24.0			24.0	24.0
Effective Green, g (s)	4.0	42.0	42.0	2.7	40.7	40.7		24.0			24.0	24.0
Actuated g/C Ratio	0.05	0.52	0.52	0.03	0.50	0.50		0.30			0.30	0.30
Clearance Time (s)	3.5	6.0	6.0	3.5	6.0	6.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	88	833	824	59	807	798		448			298	471
v/s Ratio Prot	c0.05	0.47		0.03	c0.85							
v/s Ratio Perm			0.01			0.12		0.15			c0.32	0.15
v/c Ratio	1.05	0.90	0.03	1.00	1.69	0.23		0.49			1.06	0.51
Uniform Delay, d1	38.4	17.5	9.4	39.0	20.0	11.2		23.3			28.4	23.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	108.9	14.8	0.1	117.2	313.8	0.7		0.9			69.0	0.9
Delay (s)	147.2	32.3	9.5	156.2	333.8	11.9		24.2			97.3	24.3
Level of Service	F	C	A	F	F	B		C			F	C
Approach Delay (s)		44.0			290.4			24.2			65.9	
Approach LOS		D			F			C			E	

Intersection Summary

HCM Average Control Delay	168.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.43		
Actuated Cycle Length (s)	80.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	108.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	205	860	13	29	1292	630	17	25	40	324	17	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3200		1770	3200	1559	1656	1673		3433	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3200		1770	3200	1559	1656	1673		3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	223	935	14	32	1404	685	18	27	43	352	18	182
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	223	949	0	32	1404	685	18	70	0	352	18	182
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot		pm+ov	Split			Split		Perm
Protected Phases	5	2		1	6	7	8	8		7	7	
Permitted Phases						6						7
Actuated Green, G (s)	8.8	42.9		2.2	36.3	50.6	4.0	4.0		14.3	14.3	14.3
Effective Green, g (s)	9.0	44.9		2.4	38.3	53.2	4.2	4.2		15.6	15.6	15.6
Actuated g/C Ratio	0.11	0.54		0.03	0.46	0.64	0.05	0.05		0.19	0.19	0.19
Clearance Time (s)	4.2	6.0		4.2	6.0	5.3	4.2	4.2		5.3	5.3	5.3
Vehicle Extension (s)	2.5	2.5		3.0	2.5	2.5	2.0	2.0		2.5	2.5	2.5
Lane Grp Cap (vph)	192	1729		51	1475	998	84	85		644	350	297
v/s Ratio Prot	c0.13	0.30		0.02	c0.44	c0.13	0.01	c0.04		0.10	0.01	
v/s Ratio Perm						0.31						0.11
v/c Ratio	1.16	0.55		0.63	0.95	0.69	0.21	0.82		0.55	0.05	0.61
Uniform Delay, d1	37.0	12.5		39.9	21.5	9.6	37.9	39.1		30.5	27.7	31.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	115.2	0.3		21.7	13.6	1.8	0.5	43.2		0.8	0.0	3.2
Delay (s)	152.2	12.8		61.6	35.1	11.4	38.3	82.3		31.3	27.7	34.2
Level of Service	F	B		E	D	B	D	F		C	C	C
Approach Delay (s)		39.3			27.9			73.3			32.1	
Approach LOS		D			C			E			C	

Intersection Summary

HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	83.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	184	1040	1374	17	0	577
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0			4.0
Lane Util. Factor	1.00	0.95	0.95			0.88
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	3200	3200			2787
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1770	3200	3200			2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	200	1130	1493	18	0	627
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	200	1130	1511	0	0	627
Turn Type	Prot					Over
Protected Phases	5	2	6			5
Permitted Phases						
Actuated Green, G (s)	22.4	78.4	45.4			22.4
Effective Green, g (s)	23.0	78.4	47.4			23.0
Actuated g/C Ratio	0.29	1.00	0.60			0.29
Clearance Time (s)	4.6	2.0	6.0			4.6
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	519	3200	1935			818
v/s Ratio Prot	0.11	0.35	c0.47			c0.23
v/s Ratio Perm						
v/c Ratio	0.39	0.35	0.78			0.77
Uniform Delay, d1	22.1	0.0	11.6			25.3
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	0.5	0.1	2.1			4.3
Delay (s)	22.5	0.1	13.7			29.6
Level of Service	C	A	B			C
Approach Delay (s)		3.4	13.7		29.6	
Approach LOS		A	B		C	

Intersection Summary

HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	78.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	109	921	10	7	1198	118	5	1	3	372	3	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1600	1583	1770	1600	1583	1770	1653		3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1600	1583	1770	1600	1583	1770	1653		3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	118	1001	11	8	1302	128	5	1	3	404	3	204
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	118	1001	11	8	1302	128	5	4	0	404	3	204
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6						4
Actuated Green, G (s)	7.8	105.7	105.7	0.8	98.5	98.5	0.8	3.3		20.0	22.1	22.1
Effective Green, g (s)	8.0	107.7	107.7	0.8	100.5	100.5	1.0	3.3		20.0	22.3	22.3
Actuated g/C Ratio	0.05	0.73	0.73	0.01	0.68	0.68	0.01	0.02		0.14	0.15	0.15
Clearance Time (s)	4.2	6.0	6.0	4.0	6.0	6.0	4.2	4.0		4.0	4.2	4.2
Vehicle Extension (s)	4.5	4.5	4.5	3.0	4.5	4.5	4.5	3.0		3.0	3.5	3.5
Lane Grp Cap (vph)	96	1166	1154	10	1088	1076	12	37		465	281	239
v/s Ratio Prot	c0.07	0.63		0.00	c0.81		0.00	0.00		c0.12	0.00	
v/s Ratio Perm			0.01			0.08						c0.13
v/c Ratio	1.23	0.86	0.01	0.80	1.20	0.12	0.42	0.11		0.87	0.01	0.85
Uniform Delay, d1	69.9	14.5	5.5	73.4	23.7	8.2	73.1	70.8		62.6	53.4	61.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	165.7	6.9	0.0	169.7	97.6	0.1	35.8	1.3		15.7	0.0	24.9
Delay (s)	235.6	21.5	5.5	243.1	121.3	8.3	108.9	72.1		78.3	53.4	86.0
Level of Service	F	C	A	F	F	A	F	E		E	D	F
Approach Delay (s)		43.7			111.9			92.6			80.8	
Approach LOS		D			F			F			F	

Intersection Summary

HCM Average Control Delay	81.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	147.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	1172	64	13	1180	30	70	5	30	40	4	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.96	1.00
Satd. Flow (prot)	1770	1600	1583	1770	1600	1583	1770	1620			1781	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.73	1.00			0.72	1.00
Satd. Flow (perm)	1770	1600	1583	1770	1600	1583	1353	1620			1335	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	1274	70	14	1283	33	76	5	33	43	4	78
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	65	1274	70	14	1283	33	76	38	0	0	47	78
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	5.3	112.0	112.0	1.6	108.3	108.3	13.1	13.1			13.1	13.1
Effective Green, g (s)	5.0	114.0	114.0	1.3	110.3	110.3	13.2	13.2			13.2	13.2
Actuated g/C Ratio	0.04	0.81	0.81	0.01	0.79	0.79	0.09	0.09			0.09	0.09
Clearance Time (s)	3.7	6.0	6.0	3.7	6.0	6.0	4.1	4.1			4.1	4.1
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	63	1298	1284	16	1256	1243	127	152			125	149
v/s Ratio Prot	c0.04	c0.80		0.01	c0.80			0.02				
v/s Ratio Perm			0.04			0.02	c0.06				0.04	0.05
v/c Ratio	1.03	0.98	0.05	0.88	1.02	0.03	0.60	0.25			0.38	0.52
Uniform Delay, d1	67.8	12.3	2.6	69.5	15.1	3.3	61.1	59.1			59.8	60.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	122.5	20.6	0.0	161.3	31.0	0.0	7.4	0.9			1.9	3.3
Delay (s)	190.3	32.9	2.6	230.8	46.1	3.3	68.5	59.9			61.7	63.9
Level of Service	F	C	A	F	D	A	E	E			E	E
Approach Delay (s)		38.6			46.9			65.6			63.1	
Approach LOS		D			D			E			E	

Intersection Summary

HCM Average Control Delay	44.4	HCM Level of Service	D
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	140.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1101	140	208	1006	217	381
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.97	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1600	1583	3433	1600	1770	1546
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1600	1583	3433	1600	1770	1546
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1197	152	226	1093	236	414
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1197	152	226	1093	236	414
Confl. Peds. (#/hr)			1		1	1
Heavy Vehicles (%)	2%	2%	2%	4%	2%	2%
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	86.0	86.0	8.3	98.0	32.3	32.3
Effective Green, g (s)	88.0	88.0	8.0	100.0	32.0	32.0
Actuated g/C Ratio	0.63	0.63	0.06	0.71	0.23	0.23
Clearance Time (s)	6.0	6.0	3.7	6.0	3.7	3.7
Vehicle Extension (s)	2.5	2.5	2.5	2.5	3.0	3.0
Lane Grp Cap (vph)	1006	995	196	1143	405	353
v/s Ratio Prot	c0.75		c0.07	0.68	0.13	
v/s Ratio Perm		0.10				c0.27
v/c Ratio	1.19	0.15	1.15	0.96	0.58	1.17
Uniform Delay, d1	26.0	10.7	66.0	18.0	48.1	54.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	95.5	0.1	111.6	17.0	2.1	103.7
Delay (s)	121.5	10.7	177.6	35.0	50.2	157.7
Level of Service	F	B	F	D	D	F
Approach Delay (s)	109.0			59.5	118.7	
Approach LOS	F			E	F	

Intersection Summary

HCM Average Control Delay	91.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	88.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	1361	121	157	1132	7	82	1	161	4	1	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.96	1.00
Satd. Flow (prot)	1770	1600	1583	3433	1600			1775	1568		1791	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.96	1.00
Satd. Flow (perm)	1770	1600	1583	3433	1600			1775	1568		1791	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	1479	132	171	1230	8	89	1	175	4	1	4
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	1	1479	132	171	1238	0	0	90	175	0	5	4
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Split		Perm	Split		Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	0.8	92.5	92.5	11.7	103.1			25.4	25.4		2.7	2.7
Effective Green, g (s)	0.8	94.5	94.5	11.4	105.1			25.4	25.4		2.7	2.7
Actuated g/C Ratio	0.01	0.63	0.63	0.08	0.70			0.17	0.17		0.02	0.02
Clearance Time (s)	4.0	6.0	6.0	3.7	6.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	2.5	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	9	1008	997	261	1121			301	266		32	28
v/s Ratio Prot	0.00	c0.92		c0.05	c0.77			0.05			c0.00	
v/s Ratio Perm			0.08						c0.11			0.00
v/c Ratio	0.11	1.47	0.13	0.66	1.10			0.30	0.66		0.16	0.14
Uniform Delay, d1	74.2	27.8	11.2	67.4	22.5			54.5	58.2		72.5	72.5
Progression Factor	1.00	1.00	1.00	1.04	0.72			1.00	1.00		1.00	1.00
Incremental Delay, d2	5.4	215.7	0.3	1.3	50.7			0.6	5.8		2.3	2.3
Delay (s)	79.7	243.5	11.5	71.3	66.9			55.1	64.0		74.8	74.9
Level of Service	E	F	B	E	E			E	E		E	E
Approach Delay (s)		224.4			67.4			61.0			74.8	
Approach LOS		F			E			E			E	

Intersection Summary

HCM Average Control Delay	143.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	1422	112	149	1215	1	72	2	110	1	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00			1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	0.97		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.98	1.00
Satd. Flow (prot)	1770	1600	1583	3273	1600			1776	1539		1817	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.98	1.00
Satd. Flow (perm)	1770	1600	1583	3273	1600			1776	1539		1817	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	1546	122	162	1321	1	78	2	120	1	1	2
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	2	1546	122	162	1322	0	0	80	120	0	2	2
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	2%	2%	7%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Split		Perm	Split		Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases			2						3			4
Actuated Green, G (s)	1.3	101.3	101.3	17.0	117.0			9.3	9.3		5.3	5.3
Effective Green, g (s)	1.0	103.3	103.3	16.7	119.0			9.0	9.0		5.0	5.0
Actuated g/C Ratio	0.01	0.69	0.69	0.11	0.79			0.06	0.06		0.03	0.03
Clearance Time (s)	3.7	6.0	6.0	3.7	6.0			3.7	3.7		3.7	3.7
Vehicle Extension (s)	3.0	3.0	3.0	2.5	3.0			2.5	2.5		2.5	2.5
Lane Grp Cap (vph)	12	1102	1090	364	1269			107	92		61	53
v/s Ratio Prot	0.00	c0.97		c0.05	c0.83			0.05			0.00	
v/s Ratio Perm			0.08						c0.08			c0.00
v/c Ratio	0.17	1.40	0.11	0.45	1.04			0.75	1.30		0.03	0.04
Uniform Delay, d1	74.1	23.4	7.9	62.3	15.5			69.4	70.5		70.2	70.2
Progression Factor	1.13	1.46	0.95	1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	181.8	0.0	0.6	36.8			23.3	195.7		0.2	0.2
Delay (s)	84.3	215.9	7.5	63.0	52.3			92.7	266.2		70.3	70.4
Level of Service	F	F	A	E	D			F	F		E	E
Approach Delay (s)		200.6			53.5			196.8			70.4	
Approach LOS		F			D			F			E	

Intersection Summary

HCM Average Control Delay	135.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.32		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	95.3%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	20	0	1	164	224	37
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.71	0.71	0.80	0.80	0.87	0.87
Hourly flow rate (vph)	28	0	1	205	257	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					621	
pX, platoon unblocked						
vC, conflicting volume	486	279	300			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	486	279	300			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	100	100			
cM capacity (veh/h)	540	760	1261			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	28	206	300
Volume Left	28	1	0
Volume Right	0	0	43
cSH	540	1261	1700
Volume to Capacity	0.05	0.00	0.18
Queue Length 95th (ft)	4	0	0
Control Delay (s)	12.0	0.1	0.0
Lane LOS	B	A	
Approach Delay (s)	12.0	0.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	24.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	61	1471	1322	42	2	43
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	66	1599	1437	46	2	47
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1483				3168	1437
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1483				3168	1437
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	85				78	71
cM capacity (veh/h)	454				10	163

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	66	1599	1437	46	2	47
Volume Left	66	0	0	0	2	0
Volume Right	0	0	0	46	0	47
cSH	454	1700	1700	1700	10	163
Volume to Capacity	0.15	0.94	0.85	0.03	0.22	0.29
Queue Length 95th (ft)	13	0	0	0	13	28
Control Delay (s)	14.3	0.0	0.0	0.0	448.2	35.6
Lane LOS	B				F	E
Approach Delay (s)	0.6		0.0		53.9	
Approach LOS					F	

Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	87.4%	ICU Level of Service	E
Analysis Period (min)	15		

12: Hwy 68 EB Ramps & Portola Dr.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	32	4	7	2	7	9	30	16	2	34	29	103
Peak Hour Factor	0.90	0.90	0.90	0.71	0.71	0.71	0.57	0.57	0.57	0.87	0.87	0.87
Hourly flow rate (vph)	36	4	8	3	10	13	53	28	4	39	33	118

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	48	25	53	32	39	152
Volume Left (vph)	36	3	53	0	39	0
Volume Right (vph)	8	13	0	4	0	118
Hadj (s)	0.09	-0.24	0.53	-0.04	0.53	-0.51
Departure Headway (s)	4.6	4.3	5.4	4.8	5.3	4.2
Degree Utilization, x	0.06	0.03	0.08	0.04	0.06	0.18
Capacity (veh/h)	727	772	654	731	661	828
Control Delay (s)	7.9	7.5	7.6	6.8	7.4	7.0
Approach Delay (s)	7.9	7.5	7.3		7.0	
Approach LOS	A	A	A		A	

Intersection Summary			
Delay	7.3		
HCM Level of Service	A		
Intersection Capacity Utilization	30.7%	ICU Level of Service	A
Analysis Period (min)	15		

13: Hwy 68 WB Ramps & Portola Dr.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	27	9	22	178	28	40	21	99	22	11	29	17
Peak Hour Factor	0.69	0.69	0.69	0.87	0.87	0.87	0.81	0.81	0.81	0.79	0.79	0.79
Hourly flow rate (vph)	39	13	32	205	32	46	26	122	27	14	37	22

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	84	283	26	149	14	58
Volume Left (vph)	39	205	26	0	14	0
Volume Right (vph)	32	46	0	27	0	22
Hadj (s)	-0.08	0.09	0.53	-0.09	0.53	-0.22
Departure Headway (s)	4.8	4.7	6.1	5.4	6.2	5.4
Degree Utilization, x	0.11	0.37	0.04	0.23	0.02	0.09
Capacity (veh/h)	688	723	560	624	536	610
Control Delay (s)	8.4	10.5	8.1	8.8	8.1	7.7
Approach Delay (s)	8.4	10.5	8.7		7.8	
Approach LOS	A	B	A		A	

Intersection Summary			
Delay	9.4		
HCM Level of Service	A		
Intersection Capacity Utilization	36.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	231	630	0	0	245	218	117	1	133	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0	4.0			
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00	0.99			
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1752	1863			1863	1553		1771	1562			
Flt Permitted	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	1752	1863			1863	1553		1771	1562			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	251	685	0	0	266	237	127	1	145	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	251	685	0	0	266	237	0	128	145	0	0	0
Confl. Peds. (#/hr)			2				2		2			
Heavy Vehicles (%)	3%	2%	2%	2%	2%	4%	2%	2%	2%	2%	2%	2%
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	5	2			6			8				
Permitted Phases						6	8		8			
Actuated Green, G (s)	10.7	30.0			15.6	15.6		8.3	8.3			
Effective Green, g (s)	10.4	32.0			17.6	17.6		9.2	9.2			
Actuated g/C Ratio	0.21	0.65			0.36	0.36		0.19	0.19			
Clearance Time (s)	3.7	6.0			6.0	6.0		4.9	4.9			
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0			
Lane Grp Cap (vph)	370	1212			666	556		331	292			
v/s Ratio Prot	c0.14	c0.37			0.14							
v/s Ratio Perm						0.15		0.07	c0.09			
v/c Ratio	0.68	0.57			0.40	0.43		0.39	0.50			
Uniform Delay, d1	17.9	4.8			11.8	12.0		17.5	17.9			
Progression Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2	4.9	1.9			0.4	0.5		0.8	1.3			
Delay (s)	22.7	6.7			12.2	12.5		18.3	19.3			
Level of Service	C	A			B	B		B	B			
Approach Delay (s)		11.0			12.4			18.8			0.0	
Approach LOS		B			B			B			A	

Intersection Summary

HCM Average Control Delay	12.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	49.2	Sum of lost time (s)	8.0
Intersection Capacity Utilization	82.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	493	130	100	262	0	0	0	0	368	0	273
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0						4.0	4.0
Lane Util. Factor		1.00		1.00	1.00						1.00	1.00
Frpb, ped/bikes		0.99		1.00	1.00						1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00						1.00	1.00
Frt		0.97		1.00	1.00						1.00	0.85
Flt Protected		1.00		0.95	1.00						0.95	1.00
Satd. Flow (prot)		1787		1770	1845						1770	1583
Flt Permitted		1.00		0.95	1.00						0.95	1.00
Satd. Flow (perm)		1787		1770	1845						1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	536	141	109	285	0	0	0	0	400	0	297
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	677	0	109	285	0	0	0	0	0	400	297
Confl. Peds. (#/hr)			2	2								
Heavy Vehicles (%)	2%	3%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type				Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases										4		4
Actuated Green, G (s)		32.0		5.0	40.7						19.1	19.1
Effective Green, g (s)		34.0		4.7	42.7						20.0	20.0
Actuated g/C Ratio		0.48		0.07	0.60						0.28	0.28
Clearance Time (s)		6.0		3.7	6.0						4.9	4.9
Vehicle Extension (s)		3.0		3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		859		118	1114						501	448
v/s Ratio Prot		c0.38		c0.06	0.15							
v/s Ratio Perm											0.23	0.19
v/c Ratio		0.79		0.92	0.26						0.80	0.66
Uniform Delay, d1		15.3		32.8	6.6						23.5	22.4
Progression Factor		1.00		1.00	1.00						1.00	1.00
Incremental Delay, d2		4.8		59.2	0.6						12.5	7.5
Delay (s)		20.2		92.0	7.1						36.0	29.9
Level of Service		C		F	A						D	C
Approach Delay (s)		20.2			30.6			0.0			33.4	
Approach LOS		C			C			A			C	

Intersection Summary

HCM Average Control Delay	27.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	70.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	3	5	427	6	0	0	0	0	93	1	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	3	5	464	7	0	0	0	0	101	1	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	7			9			945	941	6	941	943	7
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	7			9			945	941	6	941	943	7
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	100			71			100	100	100	44	99	100
cM capacity (veh/h)	1614			1605			187	187	1077	182	187	1076

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	9	471	105
Volume Left	0	464	101
Volume Right	5	0	3
cSH	1700	1605	187
Volume to Capacity	0.01	0.29	0.56
Queue Length 95th (ft)	0	30	75
Control Delay (s)	0.0	8.1	46.6
Lane LOS		A	E
Approach Delay (s)	0.0	8.1	46.6
Approach LOS			E

Intersection Summary			
Average Delay	14.9		
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	96	0	0	426	7	266
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	104	0	0	463	8	289
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			104		567	104
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			104		567	104
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			100		98	69
cM capacity (veh/h)			1487		485	934

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	104	463	8	289
Volume Left	0	0	8	0
Volume Right	0	0	0	289
cSH	1700	1700	485	934
Volume to Capacity	0.06	0.27	0.02	0.31
Queue Length 95th (ft)	0	0	1	33
Control Delay (s)	0.0	0.0	12.5	10.6
Lane LOS			B	B
Approach Delay (s)	0.0	0.0	10.6	
Approach LOS			B	

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		

18: Spreckels Blvd. & Hwy 68 EB Onramp

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Volume (veh/h)	6	356	417	145	0	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	387	453	158	0	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						3
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	611				853	453
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	611				853	453
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				100	98
cM capacity (veh/h)	968				327	607

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1
Volume Total	7	387	453	158	10
Volume Left	7	0	0	0	0
Volume Right	0	0	0	158	10
cSH	968	1700	1700	1700	152
Volume to Capacity	0.01	0.23	0.27	0.09	0.06
Queue Length 95th (ft)	1	0	0	0	5
Control Delay (s)	8.7	0.0	0.0	0.0	30.4
Lane LOS	A				D
Approach Delay (s)	0.1		0.0		30.4
Approach LOS					D

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	31.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	482	542	186	672	727	127	234	836	497	95	893	374
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	5.3
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1558	3433	3452		1770	3539	1561	1770	3539	1559
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1558	3433	3452		1770	3539	1561	1770	3539	1559
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	524	589	202	730	790	138	254	909	540	103	971	407
RTOR Reduction (vph)	0	0	97	0	11	0	0	0	311	0	0	252
Lane Group Flow (vph)	524	589	105	730	917	0	254	909	229	103	971	155
Confl. Peds. (#/hr)	4		3	2		3	3		2	3		3
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	20.1	27.7	27.7	26.3	33.9		18.7	40.8	40.8	11.9	34.0	34.0
Effective Green, g (s)	19.8	29.0	29.0	26.0	35.2		18.4	42.1	42.1	11.6	35.3	34.0
Actuated g/C Ratio	0.16	0.23	0.23	0.21	0.28		0.15	0.34	0.34	0.09	0.28	0.27
Clearance Time (s)	3.7	5.3	5.3	3.7	5.3		3.7	5.3	5.3	3.7	5.3	5.3
Vehicle Extension (s)	3.0	3.5	3.5	3.0	3.5		3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	545	823	362	716	974		261	1195	527	165	1002	425
v/s Ratio Prot	0.15	0.17		c0.21	c0.27		c0.14	0.26		0.06	c0.27	
v/s Ratio Perm			0.07						0.15			0.10
v/c Ratio	0.96	0.72	0.29	1.02	0.94		0.97	0.76	0.44	0.62	0.97	0.36
Uniform Delay, d1	52.1	44.1	39.4	49.4	43.7		52.9	36.8	32.1	54.5	44.2	36.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	28.9	3.1	0.5	38.6	16.6		47.9	4.6	2.6	7.2	21.9	2.4
Delay (s)	81.0	47.1	39.9	88.0	60.3		100.8	41.4	34.7	61.6	66.0	39.0
Level of Service	F	D	D	F	E		F	D	C	E	E	D
Approach Delay (s)		59.5			72.5			48.1			58.3	
Approach LOS		E			E			D			E	

Intersection Summary

HCM Average Control Delay	59.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	124.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	90.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	716	480	1	6	495	118	0	1	1	157	1	795
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	778	522	1	7	538	128	0	1	1	171	1	864
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												4
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	666			523			2630	2758	522	2695	2695	602
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	666			523			2630	2758	522	2695	2695	602
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	16			99			0	64	100	0	68	0
cM capacity (veh/h)	923			1044			0	3	554	3	3	499

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	778	523	7	666	2	1036
Volume Left	778	0	7	0	0	171
Volume Right	0	1	0	128	1	864
cSH	923	1700	1044	1700	6	18
Volume to Capacity	0.84	0.31	0.01	0.39	0.36	57.00
Queue Length 95th (ft)	257	0	0	0	17	Err
Control Delay (s)	25.8	0.0	8.5	0.0	794.6	Err
Lane LOS	D		A		F	F
Approach Delay (s)	15.4		0.1		794.6	Err
Approach LOS					F	F

Intersection Summary			
Average Delay	3446.1		
Intersection Capacity Utilization	98.3%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	739	602	15	306	653	359	33	710	282	204	699	480
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3527		1770	3539	1583	1770	3388		1770	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	3433	3527		1770	3539	1583	1770	3388		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	803	654	16	333	710	390	36	772	307	222	760	522
RTOR Reduction (vph)	0	0	0	0	0	183	0	0	0	0	0	94
Lane Group Flow (vph)	803	670	0	333	710	207	36	1079	0	222	760	428
Turn Type	Prot			Prot		Perm	Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6						4
Actuated Green, G (s)	32.3	34.3		25.9	27.4	27.4	3.0	30.5		17.5	45.5	45.5
Effective Green, g (s)	32.8	36.8		25.4	29.4	29.4	2.5	33.0		17.0	47.5	47.5
Actuated g/C Ratio	0.26	0.29		0.20	0.23	0.23	0.02	0.26		0.13	0.37	0.37
Clearance Time (s)	4.5	6.5		3.5	6.0	6.0	3.5	6.5		3.5	6.0	6.0
Vehicle Extension (s)	1.0	4.5		1.0	4.5	4.5	1.0	4.5		1.0	4.5	4.5
Lane Grp Cap (vph)	878	1012		351	812	363	35	872		235	690	587
v/s Ratio Prot	c0.23	0.19		0.19	c0.20		0.02	c0.32		0.13	c0.41	
v/s Ratio Perm						0.13						0.27
v/c Ratio	0.91	0.66		0.95	0.87	0.57	1.03	1.24		0.94	1.10	0.73
Uniform Delay, d1	46.3	40.2		50.8	47.6	43.8	62.8	47.6		55.1	40.3	34.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	13.6	3.4		34.1	12.6	6.4	160.8	116.7		42.9	65.4	5.1
Delay (s)	59.9	43.6		84.9	60.2	50.2	223.7	164.3		98.0	105.8	39.9
Level of Service	E	D		F	E	D	F	F		F	F	D
Approach Delay (s)		52.5			63.2			166.2			81.8	
Approach LOS		D			E			F			F	

Intersection Summary

HCM Average Control Delay	86.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	128.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

HCS+: Two-Lane Highways Release 5.2

Phone: Fax:
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Two-Way Two-Lane Highway Segment Analysis

Analyst	JHO
Agency/Co.	Higgins Associates
Date Performed	12/4/2006
Analysis Time Period	Background AM
Highway	68
From/To	San Benancio Rd. / Torero Dr.
Jurisdiction	
Analysis Year	
Description 6-151	

Input Data

Highway class Class 1					
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	4	%
Segment length	1.4	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	4	/mi
Up/down		%			

Two-way hourly volume, V	2594	veh/h		
Directional split	54 /	46 %		

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.996	
Two-way flow rate,(note-1) vp	2831	pc/h
Highest directional split proportion (note-2)	1529	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	1.0	mi/h
Free-flow speed, FFS	59.0	mi/h
Adjustment for no-passing zones, fnp	0.9	mi/h
Average travel speed, ATS	36.1	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	2820	pc/h
Highest directional split proportion (note-2)	1523	
Base percent time-spent-following, BPTSF	91.6	%
Adj.for directional distribution and no-passing zones, fd/np	2.1	
Percent time-spent-following, PTSF	93.7	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.88	
Peak 15-min vehicle-miles of travel, VMT15	987	veh-mi
Peak-hour vehicle-miles of travel, VMT60	3632	veh-mi
Peak 15-min total travel time, TT15	27.3	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	JHO
Agency/Co.	Higgins Associates
Date Performed	12/4/2006
Analysis Time Period	Background AM
Highway	68
From/To	Torero Dr. / Begin-End Freeway
Jurisdiction	
Analysis Year	
Description 6-151	

Input Data

Highway class Class 1					
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	4	%
Segment length	0.6	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	1	/mi
Up/down		%			

Two-way hourly volume, V	2224	veh/h		
Directional split	53 /	47 %		

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.996	
Two-way flow rate,(note-1) vp	2427	pc/h
Highest directional split proportion (note-2)	1286	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.3	mi/h
Free-flow speed, FFS	59.8	mi/h
Adjustment for no-passing zones, fnp	1.1	mi/h
Average travel speed, ATS	39.8	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	2417	pc/h
Highest directional split proportion (note-2)	1281	
Base percent time-spent-following, BPTSF	88.1	%
Adj.for directional distribution and no-passing zones, fd/np	3.0	
Percent time-spent-following, PTSF	91.0	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.76	
Peak 15-min vehicle-miles of travel, VMT15	363	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1334	veh-mi
Peak 15-min total travel time, TT15	9.1	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS+: Multilane Highways Release 5.2

Phone: Fax:
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OPERATIONAL ANALYSIS

Analyst:	SF
Agency/Co:	Higgins Associates
Date:	3/14/2008
Analysis Period:	Background AM
Highway:	68
From/To:	Spreckels Blvd. / Blanco Rd.
Jurisdiction:	
Analysis Year:	
Project ID:	Direction 1 = Eastbound Direction 2 = Westbound

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	0		0	
Median type				
Free-flow speed:	Measured		Measured	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	0.0	mph	0.0	mph
Free-flow speed	60.0	mph	60.0	mph

VOLUME

Direction	1		2	
Volume, V	1718	vph	1375	vph
Peak-hour factor, PHF	0.92		0.92	
Peak 15-minute volume, v15	467		374	
Trucks and buses	4	%	4	%
Recreational vehicles	0	%	0	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.980		0.980	
Flow rate, vp	952	pcphpl	762	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	952	pcphpl	762	pcphpl
Free-flow speed, FFS	60.0	mph	60.0	mph
Avg. passenger-car travel speed, S	60.0	mph	60.0	mph
Level of service, LOS	B		B	
Density, D	15.9	pc/mi/ln	12.7	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	JHO
Agency/Co.	Higgins Associates
Date Performed	1/16/2007
Analysis Time Period	Background AM
Highway	218
From/To	Highway 68 / General Jim Moore
Jurisdiction	
Analysis Year	
Description 6-151	

Input Data

Highway class Class 1					
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	2	%
Segment length	0.7	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	9	/mi
Up/down		%			

Two-way hourly volume, V	1300	veh/h	
Directional split	55 / 45	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.998	
Two-way flow rate,(note-1) vp	1416	pc/h
Highest directional split proportion (note-2)	779	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.3	mi/h
Free-flow speed, FFS	57.8	mi/h
Adjustment for no-passing zones, fnp	1.7	mi/h
Average travel speed, ATS	45.1	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1413	pc/h
Highest directional split proportion (note-2)	777	
Base percent time-spent-following, BPTSF	71.1	%
Adj.for directional distribution and no-passing zones, fd/np	7.9	
Percent time-spent-following, PTSF	79.0	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.44	
Peak 15-min vehicle-miles of travel, VMT15	261	veh-mi
Peak-hour vehicle-miles of travel, VMT60	962	veh-mi
Peak 15-min total travel time, TT15	5.8	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS+: Two-Lane Highways Release 5.2

Phone: Fax:
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Two-Way Two-Lane Highway Segment Analysis

Analyst	JHO
Agency/Co.	Higgins Associates
Date Performed	1/16/2007
Analysis Time Period	Background AM
Highway	Reservation Road
From/To	Davis Road / Highway 68
Jurisdiction	
Analysis Year	
Description 6-151	

Input Data

Highway class Class 1					
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	6	%
Segment length	1.8	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	7	/mi
Up/down		%			

Two-way hourly volume, V	1009	veh/h		
Directional split	52 / 48	%		

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.2	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.988	
Two-way flow rate,(note-1) vp	1110	pc/h
Highest directional split proportion (note-2)	577	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	1.8	mi/h
Free-flow speed, FFS	58.3	mi/h
Adjustment for no-passing zones, fnp	2.3	mi/h
Average travel speed, ATS	47.3	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	0.994	
Two-way flow rate,(note-1) vp	1103	pc/h
Highest directional split proportion (note-2)	574	
Base percent time-spent-following, BPTSF	62.1	%
Adj.for directional distribution and no-passing zones, fd/np	11.5	
Percent time-spent-following, PTSF	73.6	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.35	
Peak 15-min vehicle-miles of travel, VMT15	494	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1816	veh-mi
Peak 15-min total travel time, TT15	10.4	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

HCS+: Two-Lane Highways Release 5.2

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	SF
Agency/Co.	Higgins Associates
Date Performed	3/14/2008
Analysis Time Period	Background AM
Highway	Davis Road
From/To	Reservation Road / Blanco Road
Jurisdiction	
Analysis Year	
Description 8-013	

Input Data

Highway class Class 1					
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	3	%
Segment length	2.1	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	3	/mi
Up/down		%			

Two-way hourly volume, V	1420	veh/h	
Directional split	53 / 47	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.997	
Two-way flow rate,(note-1) vp	1548	pc/h
Highest directional split proportion (note-2)	820	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.8	mi/h
Free-flow speed, FFS	59.3	mi/h
Adjustment for no-passing zones, fnp	1.6	mi/h
Average travel speed, ATS	45.7	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1543	pc/h
Highest directional split proportion (note-2)	818	
Base percent time-spent-following, BPTSF	74.2	%
Adj.for directional distribution and no-passing zones, fd/np	7.1	
Percent time-spent-following, PTSF	81.3	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.48	
Peak 15-min vehicle-miles of travel, VMT15	810	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2982	veh-mi
Peak 15-min total travel time, TT15	17.7	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	JHO
Agency/Co.	Higgins Associates
Date Performed	12/4/2006
Analysis Time Period	Background PM
Highway	68
From/To	San Benancio Rd. / Torero Dr.
Jurisdiction	
Analysis Year	
Description 6-151	

Input Data

Highway class Class 1					
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	4	%
Segment length	1.4	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	4	/mi
Up/down		%			

Two-way hourly volume, V	2898	veh/h		
Directional split	53 /	47 %		

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.996	
Two-way flow rate,(note-1) vp	3163	pc/h
Highest directional split proportion (note-2)	1676	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	1.0	mi/h
Free-flow speed, FFS	59.0	mi/h
Adjustment for no-passing zones, fnp	0.7	mi/h
Average travel speed, ATS	33.7	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	3150	pc/h
Highest directional split proportion (note-2)	1670	
Base percent time-spent-following, BPTSF	93.7	%
Adj.for directional distribution and no-passing zones, fd/np	1.7	
Percent time-spent-following, PTSF	95.4	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.99	
Peak 15-min vehicle-miles of travel, VMT15	1102	veh-mi
Peak-hour vehicle-miles of travel, VMT60	4057	veh-mi
Peak 15-min total travel time, TT15	32.7	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	JHO
Agency/Co.	Higgins Associates
Date Performed	12/4/2006
Analysis Time Period	Background PM
Highway	68
From/To	Torero Dr. / Begin-End Freeway
Jurisdiction	
Analysis Year	
Description 6-151	

Input Data

Highway class Class 1					
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	4	%
Segment length	0.6	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	1	/mi
Up/down		%			

Two-way hourly volume, V	2837	veh/h		
Directional split	52 /	48 %		

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.996	
Two-way flow rate,(note-1) vp	3096	pc/h
Highest directional split proportion (note-2)	1610	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.3	mi/h
Free-flow speed, FFS	59.8	mi/h
Adjustment for no-passing zones, fnp	0.8	mi/h
Average travel speed, ATS	35.0	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	3084	pc/h
Highest directional split proportion (note-2)	1604	
Base percent time-spent-following, BPTSF	93.4	%
Adj.for directional distribution and no-passing zones, fd/np	1.7	
Percent time-spent-following, PTSF	95.1	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.97	
Peak 15-min vehicle-miles of travel, VMT15	463	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1702	veh-mi
Peak 15-min total travel time, TT15	13.2	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Phone: Fax:
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OPERATIONAL ANALYSIS

Analyst:	SF
Agency/Co:	Higgins Associates
Date:	3/14/2008
Analysis Period:	Background PM
Highway:	68
From/To:	Spreckels Blvd. / Blanco Rd.
Jurisdiction:	
Analysis Year:	
Project ID:	Direction 1 = Eastbound Direction 2 = Westbound

FREE-FLOW SPEED

Direction	1		2	
Lane width	12.0	ft	12.0	ft
Lateral clearance:				
Right edge	6.0	ft	6.0	ft
Left edge	6.0	ft	6.0	ft
Total lateral clearance	12.0	ft	12.0	ft
Access points per mile	0		0	
Median type				
Free-flow speed:	Measured		Measured	
FFS or BFFS	60.0	mph	60.0	mph
Lane width adjustment, FLW	0.0	mph	0.0	mph
Lateral clearance adjustment, FLC	0.0	mph	0.0	mph
Median type adjustment, FM	0.0	mph	0.0	mph
Access points adjustment, FA	0.0	mph	0.0	mph
Free-flow speed	60.0	mph	60.0	mph

VOLUME

Direction	1		2	
Volume, V	1847	vph	1830	vph
Peak-hour factor, PHF	0.92		0.92	
Peak 15-minute volume, v15	502		497	
Trucks and buses	4	%	2	%
Recreational vehicles	0	%	0	%
Terrain type	Level		Level	
Grade	0.00	%	0.00	%
Segment length	0.00	mi	0.00	mi
Number of lanes	2		2	
Driver population adjustment, fP	1.00		1.00	
Trucks and buses PCE, ET	1.5		1.5	
Recreational vehicles PCE, ER	1.2		1.2	
Heavy vehicle adjustment, fHV	0.980		0.990	
Flow rate, vp	1023	pcphpl	1004	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	1023	pcphpl	1004	pcphpl
Free-flow speed, FFS	60.0	mph	60.0	mph
Avg. passenger-car travel speed, S	60.0	mph	60.0	mph
Level of service, LOS	B		B	
Density, D	17.0	pc/mi/ln	16.7	pc/mi/ln

Overall results are not computed when free-flow speed is less than 45 mph.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	JHO
Agency/Co.	Higgins Associates
Date Performed	1/16/2007
Analysis Time Period	Background PM
Highway	218
From/To	Highway 68 / General Jim Moore
Jurisdiction	
Analysis Year	
Description 6-151	

Input Data

Highway class Class 1					
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	2	%
Segment length	0.7	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	9	/mi
Up/down		%			

Two-way hourly volume, V	1368	veh/h	
Directional split	63 / 37	%	

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.998	
Two-way flow rate,(note-1) vp	1490	pc/h
Highest directional split proportion (note-2)	939	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.3	mi/h
Free-flow speed, FFS	57.8	mi/h
Adjustment for no-passing zones, fnp	1.6	mi/h
Average travel speed, ATS	44.6	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1487	pc/h
Highest directional split proportion (note-2)	937	
Base percent time-spent-following, BPTSF	72.9	%
Adj.for directional distribution and no-passing zones, fd/np	7.6	
Percent time-spent-following, PTSF	80.5	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.47	
Peak 15-min vehicle-miles of travel, VMT15	275	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1012	veh-mi
Peak 15-min total travel time, TT15	6.2	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Phone: Fax:
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Two-Way Two-Lane Highway Segment Analysis

Analyst	JHO
Agency/Co.	Higgins Associates
Date Performed	1/16/2007
Analysis Time Period	Background PM
Highway	Reservation Road
From/To	Davis Road / Highway 68
Jurisdiction	
Analysis Year	
Description 6-151	

Input Data

Highway class Class 1					
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	6	%
Segment length	1.8	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	7	/mi
Up/down		%			

Two-way hourly volume, V	1257	veh/h		
Directional split	51 / 49	%		

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.994	
Two-way flow rate,(note-1) vp	1375	pc/h
Highest directional split proportion (note-2)	701	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	1.8	mi/h
Free-flow speed, FFS	58.3	mi/h
Adjustment for no-passing zones, fnp	1.8	mi/h
Average travel speed, ATS	45.8	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1366	pc/h
Highest directional split proportion (note-2)	697	
Base percent time-spent-following, BPTSF	69.9	%
Adj.for directional distribution and no-passing zones, fd/np	8.3	
Percent time-spent-following, PTSF	78.2	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.43	
Peak 15-min vehicle-miles of travel, VMT15	615	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2263	veh-mi
Peak 15-min total travel time, TT15	13.4	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.

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Phone: Fax:
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Two-Way Two-Lane Highway Segment Analysis

Analyst	SF
Agency/Co.	Higgins Associates
Date Performed	3/14/2008
Analysis Time Period	Background PM
Highway	Davis Road
From/To	Reservation Road / Blanco Road
Jurisdiction	
Analysis Year	
Description 8-013	

Input Data

Highway class Class 1					
Shoulder width	6.0	ft	Peak-hour factor, PHF	0.92	
Lane width	12.0	ft	% Trucks and buses	3	%
Segment length	2.1	mi	% Recreational vehicles	0	%
Terrain type	Level		% No-passing zones	100	%
Grade: Length		mi	Access points/mi	3	/mi
Up/down		%			

Two-way hourly volume, V 2095 veh/h
Directional split 56 / 44 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.997	
Two-way flow rate,(note-1) vp	2284	pc/h
Highest directional split proportion (note-2)	1279	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.8	mi/h
Free-flow speed, FFS	59.3	mi/h
Adjustment for no-passing zones, fnp	1.1	mi/h
Average travel speed, ATS	40.4	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	2277	pc/h
Highest directional split proportion (note-2)	1275	
Base percent time-spent-following, BPTSF	86.5	%
Adj.for directional distribution and no-passing zones, fd/np	3.4	
Percent time-spent-following, PTSF	89.9	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.71	
Peak 15-min vehicle-miles of travel, VMT15	1196	veh-mi
Peak-hour vehicle-miles of travel, VMT60	4399	veh-mi
Peak 15-min total travel time, TT15	29.6	veh-h

Notes:
1. If vp >= 3200 pc/h, terminate analysis-the LOS is F.
2. If highest directional split vp >= 1700 pc/h, terminate analysis-the LOS is F.