Appendix B

Level of Service Calculation Worksheets

Existing Conditions

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1035	72	45	886	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	0.91	0.91	0.58	0.58
Adj. Flow (vph)	1125	78	49	974	257	102
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1125	78	49	974	257	102
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	75.7	75.7	3.3	82.7	16.0	16.0
Effective Green, g (s)	77.7	77.7	3.0	84.7	16.2	16.2
Actuated g/C Ratio	0.71	0.71	0.03	0.78	0.15	0.15
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)	1142	1129	49	1244	263	235
v/s Ratio Prot	c0.70		0.03	c0.61	c0.15	
v/s Ratio Perm		0.05				0.06
v/c Ratio	0.99	0.07	1.00	0.78	0.98	0.43
Uniform Delay, d1	15.0	4.7	53.0	6.9	46.2	42.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	22.8	0.0	128.6	3.0	48.5	0.5
Delay (s)	37.9	4.7	181.5	9.9	94.6	42.6
Level of Service	D	A	F	A	F	D
Approach Delay (s)	35.7			18.1	79.9	
Approach LOS	D			B	E	

Intersection Summary

HCM Average Control Delay	34.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	108.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.4%	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)	141	929	24	93	796	243	68	31	70	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		1717			1785	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.67			0.51	1.00
Satd. Flow (perm)	1770	1600	1553	1703	1600	1583		1181			949	1583
Peak-hour factor, PHF	0.87	0.87	0.87	0.91	0.91	0.91	0.60	0.60	0.60	0.84	0.84	0.84
Adj. Flow (vph)	162	1068	28	102	875	267	113	52	117	114	31	80
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	162	1068	28	102	875	267	0	282	0	0	145	80
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)	12.5	72.5	72.5	8.0	68.0	68.0		26.0			26.0	26.0
Effective Green, g (s)	12.0	74.5	74.5	7.5	70.0	70.0		26.0			26.0	26.0
Actuated g/C Ratio	0.10	0.62	0.62	0.06	0.58	0.58		0.22			0.22	0.22
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)	177	993	964	106	933	923		256			206	343
v/s Ratio Prot	c0.09	c0.67		0.06	0.55							
v/s Ratio Perm			0.02			0.17		c0.24			0.15	0.05
v/c Ratio	0.92	1.08	0.03	0.96	0.94	0.29		1.10			0.70	0.23
Uniform Delay, d1	53.5	22.8	8.8	56.1	23.0	12.5		47.0			43.4	38.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	43.8	51.1	0.1	74.9	17.8	0.8		86.2			10.4	0.4
Delay (s)	97.3	73.9	8.8	131.0	40.8	13.3		133.2			53.8	39.1
Level of Service	F	E	A	F	D	B		F			D	D
Approach Delay (s)		75.5			42.3			133.2			48.6	
Approach LOS		E			D			F			D	

Intersection Summary

HCM Average Control Delay	65.1	HCM Level of Service	E
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	80.4%	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)	125	962	8	12	947	386	5	3	9	461	19	180
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	0.89		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)	1752	3200		1444	3200	1568	1770	1449		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)	1752	3200		1444	3200	1568	1770	1449		3433	1863	1583
Peak-hour factor, PHF	0.82	0.82	0.82	0.94	0.94	0.94	0.85	0.85	0.85	0.79	0.79	0.79
Adj. Flow (vph)	152	1173	10	13	1007	411	6	4	11	584	24	228
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	152	1183	0	13	1007	411	6	15	0	584	24	228
Heavy Vehicles (%)	3%	2%	13%	25%	4%	3%	2%	2%	22%	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	36.5		0.5	28.2	45.0	1.4	1.4		16.8	16.8	16.8
Effective Green, g (s)	9.0	38.5		0.7	30.2	47.6	1.6	1.6		18.1	18.1	18.1
Actuated g/C Ratio	0.12	0.51		0.01	0.40	0.64	0.02	0.02		0.24	0.24	0.24
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)	211	1645		13	1290	996	38	31		830	450	383
v/s Ratio Prot	c0.09	0.37		0.01	c0.31	0.10	0.00	c0.01		c0.17	0.01	
v/s Ratio Perm						0.16						0.14
v/c Ratio	0.72	0.72		1.00	0.78	0.41	0.16	0.48		0.70	0.05	0.60
Uniform Delay, d1	31.7	14.0		37.1	19.5	6.7	36.0	36.2		25.9	21.8	25.2
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	10.8	1.4		249.6	3.0	0.2	0.7	4.3		2.5	0.0	2.1
Delay (s)	42.5	15.5		286.7	22.5	6.9	36.7	40.5		28.5	21.9	27.2
Level of Service	D	B		F	C	A	D	D		C	C	C
Approach Delay (s)		18.5			20.4			39.4			27.9	
Approach LOS		B			C			D			C	

Intersection Summary

HCM Average Control Delay	21.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	74.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	62.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	510	922	1193	10	0	152
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			2760
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1770	3200	3200			2760
Peak-hour factor, PHF	0.91	0.91	0.95	0.95	0.79	0.79
Adj. Flow (vph)	560	1013	1256	11	0	192
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	560	1013	1267	0	0	192
Heavy Vehicles (%)	2%	2%	3%	2%	2%	3%
Turn Type	Prot					Over
Protected Phases	5	2	6			5
Permitted Phases						
Actuated Green, G (s)	28.5	78.8	39.7			28.5
Effective Green, g (s)	29.1	78.8	41.7			29.1
Actuated g/C Ratio	0.37	1.00	0.53			0.37
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)	654	3200	1693			1019
v/s Ratio Prot	c0.32	0.32	c0.40			0.07
v/s Ratio Perm						
v/c Ratio	0.86	0.32	0.75			0.19
Uniform Delay, d1	22.9	0.0	14.5			16.8
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	10.7	0.1	1.9			0.1
Delay (s)	33.6	0.1	16.3			16.9
Level of Service	C	A	B			B
Approach Delay (s)		12.0	16.3		16.9	
Approach LOS		B	B		B	

Intersection Summary

HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	78.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	68.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	220	702	1092	323	86	111
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	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	1600	1600	1583	1770	1568
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1600	1600	1583	1770	1568
Peak-hour factor, PHF	0.92	0.92	0.93	0.93	0.55	0.55
Adj. Flow (vph)	239	763	1174	347	156	202
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	239	763	1174	347	156	202
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%
Turn Type	Prot			Perm		Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	16.8	110.8	89.8	89.8	19.0	19.0
Effective Green, g (s)	17.0	112.8	91.8	91.8	19.2	19.2
Actuated g/C Ratio	0.12	0.81	0.66	0.66	0.14	0.14
Clearance Time (s)	4.2	6.0	6.0	6.0	4.2	4.2
Vehicle Extension (s)	4.5	4.5	4.5	4.5	3.5	3.5
Lane Grp Cap (vph)	215	1289	1049	1038	243	215
v/s Ratio Prot	c0.14	0.48	c0.73		0.09	
v/s Ratio Perm				0.22		c0.13
v/c Ratio	1.11	0.59	1.12	0.33	0.64	0.94
Uniform Delay, d1	61.5	5.1	24.1	10.6	57.1	59.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	94.5	1.0	66.6	0.3	5.9	44.5
Delay (s)	156.0	6.0	90.7	11.0	63.1	104.3
Level of Service	F	A	F	B	E	F
Approach Delay (s)		41.8	72.5		86.4	
Approach LOS		D	E		F	

Intersection Summary

HCM Average Control Delay	63.6	HCM Level of Service	E
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	84.4%	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)	27	715	46	21	1301	29	51	2	28	19	1	63
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	1566			1773	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	1384	1566			1356	1583
Peak-hour factor, PHF	0.87	0.87	0.87	0.95	0.95	0.95	0.88	0.88	0.88	0.90	0.90	0.90
Adj. Flow (vph)	31	822	53	22	1369	31	58	2	32	21	1	70
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	31	822	53	22	1369	31	58	34	0	0	22	70
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	109.2	109.2	3.7	109.8	109.8	9.8	9.8			9.8	9.8
Effective Green, g (s)	2.8	111.2	111.2	3.4	111.8	111.8	9.9	9.9			9.9	9.9
Actuated g/C Ratio	0.02	0.81	0.81	0.02	0.82	0.82	0.07	0.07			0.07	0.07
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	1303	1290	44	1310	1265	100	114			98	115
v/s Ratio Prot	c0.02	0.51		0.01	c0.86			0.02				
v/s Ratio Perm			0.03			0.02	0.04				0.02	c0.04
v/c Ratio	0.86	0.63	0.04	0.50	1.05	0.02	0.58	0.30			0.22	0.61
Uniform Delay, d1	66.7	4.8	2.4	65.7	12.4	2.3	61.3	60.0			59.7	61.4
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	95.3	1.1	0.0	8.7	37.5	0.0	7.9	1.5			1.2	8.8
Delay (s)	161.9	6.0	2.4	74.4	49.8	2.3	69.2	61.5			60.8	70.2
Level of Service	F	A	A	E	D	A	E	E			E	E
Approach Delay (s)		11.1			49.2			66.4			68.0	
Approach LOS		B			D			E			E	

Intersection Summary

HCM Average Control Delay	36.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	136.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	636	136	228	1145	206	233
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
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	1770	1600	1770	1547
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1600	1583	1770	1600	1770	1547
Peak-hour factor, PHF	0.96	0.96	0.98	0.98	0.87	0.87
Adj. Flow (vph)	662	142	233	1168	237	268
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	662	142	233	1168	237	268
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)	52.3	52.3	16.0	72.0	18.3	18.3
Effective Green, g (s)	54.3	54.3	15.7	74.0	18.0	18.0
Actuated g/C Ratio	0.54	0.54	0.16	0.74	0.18	0.18
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)	869	860	278	1184	319	278
v/s Ratio Prot	0.41		0.13	c0.73	0.13	
v/s Ratio Perm		0.09				c0.17
v/c Ratio	0.76	0.17	0.84	0.99	0.74	0.96
Uniform Delay, d1	17.8	11.5	40.9	12.5	38.8	40.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.8	0.1	19.0	22.7	9.0	43.8
Delay (s)	21.6	11.5	59.9	35.2	47.8	84.5
Level of Service	C	B	E	D	D	F
Approach Delay (s)	19.8			39.3	67.3	
Approach LOS	B			D	E	

Intersection Summary

HCM Average Control Delay	38.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	824	52	86	1219	154	196
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	1752	1600	1752	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1600	1583	1752	1600	1752	1583
Peak-hour factor, PHF	0.85	0.85	0.98	0.98	0.90	0.90
Adj. Flow (vph)	969	61	88	1244	171	218
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	969	61	88	1244	171	218
Heavy Vehicles (%)	2%	2%	3%	2%	3%	2%
Turn Type		pm+ov	Prot			Perm
Protected Phases	2	3	1	6	3	
Permitted Phases		2				3
Actuated Green, G (s)	87.1	107.2	9.4	100.2	20.1	20.1
Effective Green, g (s)	89.1	106.6	9.1	102.2	19.8	19.8
Actuated g/C Ratio	0.69	0.82	0.07	0.79	0.15	0.15
Clearance Time (s)	6.0	3.7	3.7	6.0	3.7	3.7
Vehicle Extension (s)	3.0	2.5	2.5	3.0	2.5	2.5
Lane Grp Cap (vph)	1097	1298	123	1258	267	241
v/s Ratio Prot	0.61	0.01	0.05	c0.78	0.10	
v/s Ratio Perm		0.03				c0.14
v/c Ratio	0.88	0.05	0.72	0.99	0.64	0.90
Uniform Delay, d1	16.3	2.2	59.2	13.4	51.8	54.2
Progression Factor	1.00	1.00	0.98	1.49	1.00	1.00
Incremental Delay, d2	10.4	0.0	4.6	10.4	4.6	33.4
Delay (s)	26.7	2.2	62.8	30.3	56.3	87.6
Level of Service	C	A	E	C	E	F
Approach Delay (s)	25.2			32.4	73.9	
Approach LOS	C			C	E	

Intersection Summary

HCM Average Control Delay	35.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.4%	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)	0	964	34	60	1199	1	105	0	127	0	0	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
Lane Util. Factor		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	0.97			1.00
Flpb, ped/bikes		1.00	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			0.85
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00			1.00
Satd. Flow (prot)		1600	1583	1687	1600			1770	1542			1583
Flt Permitted		1.00	1.00	0.95	1.00			0.95	1.00			1.00
Satd. Flow (perm)		1600	1583	1687	1600			1770	1542			1583
Peak-hour factor, PHF	0.83	0.83	0.83	0.96	0.96	0.96	0.77	0.77	0.77	0.25	0.25	0.25
Adj. Flow (vph)	0	1161	41	62	1249	1	136	0	165	0	0	4
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	1161	41	62	1250	0	0	136	165	0	0	4
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)		83.5	83.5	12.6	99.8			11.3	11.3			5.5
Effective Green, g (s)		85.5	85.5	12.3	101.8			11.0	11.0			5.2
Actuated g/C Ratio		0.66	0.66	0.09	0.78			0.08	0.08			0.04
Clearance Time (s)		6.0	6.0	3.7	6.0			3.7	3.7			3.7
Vehicle Extension (s)		3.0	3.0	2.5	3.0			2.5	2.5			2.5
Lane Grp Cap (vph)		1052	1041	160	1253			150	130			63
v/s Ratio Prot		c0.73		0.04	c0.78			0.08				
v/s Ratio Perm			0.03						c0.11			c0.00
v/c Ratio		1.10	0.04	0.39	1.00			0.91	1.27			0.06
Uniform Delay, d1		22.2	7.8	55.3	14.0			59.0	59.5			60.1
Progression Factor		1.33	1.27	1.00	1.00			1.00	1.00			1.00
Incremental Delay, d2		54.0	0.0	1.1	24.9			46.5	168.2			0.3
Delay (s)		83.5	10.0	56.4	38.8			105.5	227.7			60.4
Level of Service		F	B	E	D			F	F			E
Approach Delay (s)		81.0			39.7			172.5			60.4	
Approach LOS		F			D			F			E	

Intersection Summary

HCM Average Control Delay	71.5	HCM Level of Service	E
HCM Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.6%	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	205	87	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	247	147	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	405	153	159			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	405	153	159			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	100	100			
cM capacity (veh/h)	601	893	1420			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	44	249	159
Volume Left	44	2	0
Volume Right	0	0	12
cSH	601	1420	1700
Volume to Capacity	0.07	0.00	0.09
Queue Length 95th (ft)	6	0	0
Control Delay (s)	11.5	0.1	0.0
Lane LOS	B	A	
Approach Delay (s)	11.5	0.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	17	1074	901	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	1220	990	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	998				2251	992
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	998				2251	992
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				97	0
cM capacity (veh/h)	693				44	298

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	19	1220	990	7	1	513
Volume Left	19	0	0	0	1	0
Volume Right	0	0	0	7	0	513
cSH	693	1700	1700	1700	44	298
Volume to Capacity	0.03	0.72	0.58	0.00	0.03	1.72
Queue Length 95th (ft)	2	0	0	0	2	819
Control Delay (s)	10.3	0.0	0.0	0.0	88.9	368.9
Lane LOS	B				F	F
Approach Delay (s)	0.2		0.0		368.2	
Approach LOS					F	

Intersection Summary			
Average Delay	68.9		
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
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)	191	332	0	0	319	455	98	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	0.87	0.87	0.87	0.89	0.89	0.89	0.85	0.85	0.85	0.92	0.92	0.92
Adj. Flow (vph)	220	382	0	0	358	511	115	1	91	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	220	382	0	0	358	511	0	116	91	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)	15.8	68.6			49.1	49.1		11.2	11.2			
Effective Green, g (s)	15.5	70.6			51.1	51.1		12.1	12.1			
Actuated g/C Ratio	0.17	0.78			0.56	0.56		0.13	0.13			
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)	302	1395			1039	892		236	208			
v/s Ratio Prot	c0.12	0.21			0.19							
v/s Ratio Perm						c0.32		0.07	0.06			
v/c Ratio	0.73	0.27			0.34	0.57		0.49	0.44			
Uniform Delay, d1	35.6	2.8			10.7	12.8		36.4	36.2			
Progression Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2	8.5	0.5			0.2	0.9		1.6	1.5			
Delay (s)	44.1	3.3			10.9	13.7		38.1	37.6			
Level of Service	D	A			B	B		D	D			
Approach Delay (s)		18.2			12.5			37.9			0.0	
Approach LOS		B			B			D			A	

Intersection Summary

HCM Average Control Delay	17.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	90.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
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	369	75	129	288	0	0	0	0	154	6	122
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		0.98		1.00	1.00						1.00	0.85
Flt Protected		1.00		0.95	1.00						0.95	1.00
Satd. Flow (prot)		1763		1770	1845						1741	1524
Flt Permitted		1.00		0.95	1.00						0.95	1.00
Satd. Flow (perm)		1763		1770	1845						1741	1524
Peak-hour factor, PHF	0.84	0.84	0.84	0.88	0.88	0.88	0.92	0.92	0.92	0.81	0.81	0.81
Adj. Flow (vph)	0	439	89	147	327	0	0	0	0	190	7	151
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	528	0	147	327	0	0	0	0	0	197	151
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)		19.3		6.8	29.8						19.3	19.3
Effective Green, g (s)		21.3		6.5	31.8						20.2	20.2
Actuated g/C Ratio		0.36		0.11	0.53						0.34	0.34
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)		626		192	978						586	513
v/s Ratio Prot		c0.30		c0.08	0.18							
v/s Ratio Perm											0.11	0.10
v/c Ratio		0.84		0.77	0.33						0.34	0.29
Uniform Delay, d1		17.8		26.0	8.1						14.9	14.7
Progression Factor		1.00		1.00	1.00						1.00	1.00
Incremental Delay, d2		10.1		16.5	0.9						1.5	1.5
Delay (s)		27.9		42.5	9.0						16.4	16.1
Level of Service		C		D	A						B	B
Approach Delay (s)		27.9			19.4			0.0			16.3	
Approach LOS		C			B			A			B	

Intersection Summary

HCM Average Control Delay	21.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	54.6%	ICU Level of Service	A
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	218	0	0	0	0	0	90	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.25	0.25	0.73	0.73	0.73	0.92	0.92	0.92	0.75	0.75	0.75
Hourly flow rate (vph)	0	0	0	299	0	0	0	0	0	120	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			599	597	0	597	597	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			0			599	597	0	597	597	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			82			100	100	100	66	100	100
cM capacity (veh/h)	1623			1617			353	339	1085	348	339	1085

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	0	299	123
Volume Left	0	299	120
Volume Right	0	0	1
cSH	1700	1617	351
Volume to Capacity	0.00	0.18	0.35
Queue Length 95th (ft)	0	17	38
Control Delay (s)	0.0	7.7	20.7
Lane LOS		A	C
Approach Delay (s)	0.0	7.7	20.7
Approach LOS			C

Intersection Summary			
Average Delay	11.5		
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	90	0	0	218	0	194
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.62	0.62
Hourly flow rate (vph)	120	0	0	291	0	313
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			120		411	120
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			120		411	120
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	66
cM capacity (veh/h)			1468		597	926

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	120	291	0	313
Volume Left	0	0	0	0
Volume Right	0	0	0	313
cSH	1700	1700	1700	926
Volume to Capacity	0.07	0.17	0.00	0.34
Queue Length 95th (ft)	0	0	0	38
Control Delay (s)	0.0	0.0	0.0	10.9
Lane LOS			A	B
Approach Delay (s)	0.0	0.0	10.9	
Approach LOS			B	

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	23.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	4	280	218	73	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.69	0.69	0.75	0.75	0.50	0.50
Hourly flow rate (vph)	6	406	291	97	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	388				708	291
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	388				708	291
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)	1170				399	749

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	6	406	291	97	0
Volume Left	6	0	0	0	0
Volume Right	0	0	0	97	0
cSH	1170	1700	1700	1700	1700
Volume to Capacity	0.00	0.24	0.17	0.06	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	8.1	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	0.1		
Intersection Capacity Utilization	18.1%	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)	194	505	203	404	353	75	240	756	570	107	511	152
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	0.97		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	3437		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	3437		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)	211	549	221	439	384	82	261	822	620	116	555	165
RTOR Reduction (vph)	0	0	131	0	16	0	0	0	220	0	0	116
Lane Group Flow (vph)	211	549	90	439	450	0	261	822	400	116	555	49
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)	11.4	22.1	22.1	16.6	27.3		19.0	40.5	40.5	10.6	32.1	32.1
Effective Green, g (s)	11.1	23.4	23.4	16.3	28.6		18.7	41.8	41.8	10.3	33.4	32.1
Actuated g/C Ratio	0.10	0.22	0.22	0.15	0.27		0.17	0.39	0.39	0.10	0.31	0.30
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)	353	768	344	519	912		307	1372	614	169	1096	465
v/s Ratio Prot	0.06	c0.16		c0.13	0.13		c0.15	0.23		0.07	0.16	
v/s Ratio Perm			0.06						c0.25			0.03
v/c Ratio	0.60	0.71	0.26	0.85	0.49		0.85	0.60	0.65	0.69	0.51	0.11
Uniform Delay, d1	46.2	39.1	35.0	44.5	33.5		43.2	26.3	27.0	47.2	30.5	27.4
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	2.7	3.3	0.5	12.1	0.5		19.6	1.9	5.3	11.0	1.7	0.5
Delay (s)	48.9	42.4	35.5	56.6	34.0		62.8	28.3	32.3	58.2	32.1	27.9
Level of Service	D	D	D	E	C		E	C	C	E	C	C
Approach Delay (s)		42.3			44.9			35.0			34.9	
Approach LOS		D			D			D			C	

Intersection Summary

HCM Average Control Delay	38.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	107.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.9%	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 (veh/h)	68	208	0	0	267	151	1	5	7	157	1	130
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.69	0.69	0.69	0.93	0.93	0.93	0.65	0.65	0.65	0.78	0.78	0.78
Hourly flow rate (vph)	99	301	0	0	287	162	2	8	11	201	1	167
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	449			301			786	948	301	881	867	368
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	449			301			786	948	301	881	867	368
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 %	91			100			99	97	99	16	100	75
cM capacity (veh/h)	1106			1260			217	238	738	238	265	677

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	99	301	0	449	20	369
Volume Left	99	0	0	0	2	201
Volume Right	0	0	0	162	11	167
cSH	1106	1700	1700	1700	370	415
Volume to Capacity	0.09	0.18	0.00	0.26	0.05	0.89
Queue Length 95th (ft)	7	0	0	0	4	231
Control Delay (s)	8.6	0.0	0.0	0.0	15.3	52.8
Lane LOS	A				C	F
Approach Delay (s)	2.1		0.0		15.3	52.8
Approach LOS					C	F

Intersection Summary			
Average Delay	16.7		
Intersection Capacity Utilization	52.4%	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)	372	434	18	33	526	213	24	193	52	176	247	680
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	0.97		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	3515		1770	3539	1562	1770	3416		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	3515		1770	3539	1562	1770	3416		1770	1863	1583
Peak-hour factor, PHF	0.77	0.77	0.77	0.91	0.91	0.91	0.85	0.85	0.85	0.91	0.91	0.91
Adj. Flow (vph)	483	564	23	36	578	234	28	227	61	193	271	747
RTOR Reduction (vph)	0	0	0	0	0	171	0	0	0	0	0	285
Lane Group Flow (vph)	483	587	0	36	578	63	28	288	0	193	271	462
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)	13.7	31.8		3.3	20.9	20.9	1.9	13.7		16.1	28.4	28.4
Effective Green, g (s)	14.2	34.3		2.8	22.9	22.9	1.4	16.2		15.6	30.4	30.4
Actuated g/C Ratio	0.17	0.40		0.03	0.27	0.27	0.02	0.19		0.18	0.36	0.36
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)	574	1420		58	955	421	29	652		325	667	567
v/s Ratio Prot	c0.14	0.17		0.02	c0.16		c0.02	0.08		0.11	0.15	
v/s Ratio Perm						0.04						c0.29
v/c Ratio	0.84	0.41		0.62	0.61	0.15	0.97	0.44		0.59	0.41	0.81
Uniform Delay, d1	34.3	18.1		40.5	27.1	23.6	41.7	30.4		31.7	20.5	24.7
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	10.3	0.9		13.9	2.8	0.8	150.6	0.8		1.9	0.7	9.7
Delay (s)	44.6	19.0		54.4	29.9	24.3	192.4	31.2		33.7	21.2	34.4
Level of Service	D	B		D	C	C	F	C		C	C	C
Approach Delay (s)		30.6			29.4			45.5			31.3	
Approach LOS		C			C			D			C	

Intersection Summary

HCM Average Control Delay	31.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	84.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	587	48	43	1278	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	0.81	0.81	0.91	0.91	0.84	0.84
Adj. Flow (vph)	725	59	47	1404	85	99
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	725	59	47	1404	85	99
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	86.8	86.8	6.7	97.2	11.3	11.3
Effective Green, g (s)	88.8	88.8	6.4	99.2	11.5	11.5
Actuated g/C Ratio	0.75	0.75	0.05	0.84	0.10	0.10
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)	1197	1184	95	1337	171	153
v/s Ratio Prot	0.45		0.03	c0.88	0.05	
v/s Ratio Perm		0.04				c0.06
v/c Ratio	0.61	0.05	0.49	1.05	0.50	0.65
Uniform Delay, d1	6.9	3.9	54.6	9.8	50.9	51.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.6	0.0	4.0	38.9	0.8	6.9
Delay (s)	7.5	3.9	58.6	48.7	51.7	58.5
Level of Service	A	A	E	D	D	E
Approach Delay (s)	7.2			49.0	55.4	
Approach LOS	A			D	E	

Intersection Summary

HCM Average Control Delay	35.9	HCM Level of Service	D
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	118.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.9%	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)	85	569	16	46	1072	168	30	33	134	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		0.83			0.53	1.00
Satd. Flow (perm)	1770	1600	1583	1770	1600	1583		1403			987	1583
Peak-hour factor, PHF	0.77	0.77	0.77	0.97	0.97	0.97	0.88	0.88	0.88	0.83	0.83	0.83
Adj. Flow (vph)	110	739	21	47	1105	173	34	38	152	299	51	264
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	110	739	21	47	1105	173	0	224	0	0	350	264
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	41.5	41.5	2.4	39.4	39.4		24.0			24.0	24.0
Effective Green, g (s)	4.0	43.5	43.5	1.9	41.4	41.4		24.0			24.0	24.0
Actuated g/C Ratio	0.05	0.53	0.53	0.02	0.51	0.51		0.29			0.29	0.29
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)	87	855	846	41	814	805		414			291	467
v/s Ratio Prot	c0.06	0.46		0.03	c0.69							
v/s Ratio Perm			0.01			0.11		0.16			c0.35	0.17
v/c Ratio	1.26	0.86	0.02	1.15	1.36	0.21		0.54			1.20	0.57
Uniform Delay, d1	38.7	16.4	8.9	39.8	20.0	11.0		24.1			28.7	24.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	183.2	11.3	0.1	187.0	168.9	0.6		1.4			119.3	1.6
Delay (s)	221.9	27.7	9.0	226.7	188.9	11.6		25.5			148.0	25.9
Level of Service	F	C	A	F	F	B		C			F	C
Approach Delay (s)		51.8			167.1			25.5			95.5	
Approach LOS		D			F			C			F	

Intersection Summary

HCM Average Control Delay	109.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.29		
Actuated Cycle Length (s)	81.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	102.0%	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)	175	774	2	10	1140	576	11	21	31	262	8	135
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		1769	3200	1559	1656	1603		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		1769	3200	1559	1656	1603		3433	1863	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.92	0.92	0.92	0.66	0.66	0.66	0.83	0.83	0.83
Adj. Flow (vph)	186	823	2	11	1239	626	17	32	47	316	10	163
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	186	825	0	11	1239	626	17	79	0	316	10	163
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	2%	50%	2%	2%	2%	9%	14%	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)	9.3	44.5		0.6	35.8	49.0	4.8	4.8		13.2	13.2	13.2
Effective Green, g (s)	9.5	46.5		0.8	37.8	51.6	5.0	5.0		14.5	14.5	14.5
Actuated g/C Ratio	0.11	0.56		0.01	0.46	0.62	0.06	0.06		0.18	0.18	0.18
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)	203	1797		17	1461	972	100	97		601	326	277
v/s Ratio Prot	c0.11	0.26		0.01	c0.39	c0.11	0.01	c0.05		0.09	0.01	
v/s Ratio Perm						0.29						0.10
v/c Ratio	0.92	0.46		0.65	0.85	0.64	0.17	0.81		0.53	0.03	0.59
Uniform Delay, d1	36.3	10.7		40.9	20.0	9.8	36.9	38.4		31.0	28.3	31.4
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	40.2	0.1		62.0	4.7	1.3	0.3	37.1		0.6	0.0	2.6
Delay (s)	76.4	10.9		102.9	24.7	11.1	37.2	75.5		31.7	28.3	34.0
Level of Service	E	B		F	C	B	D	E		C	C	C
Approach Delay (s)		22.9			20.6			68.8			32.4	
Approach LOS		C			C			E			C	

Intersection Summary

HCM Average Control Delay	24.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	82.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	65.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	148	919	1254	17	0	472
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	0.84	0.84	0.94	0.94	0.68	0.68
Adj. Flow (vph)	176	1094	1334	18	0	694
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	176	1094	1352	0	0	694
Turn Type	Prot					Over
Protected Phases	5	2	6			5
Permitted Phases						
Actuated Green, G (s)	23.7	78.5	44.2			23.7
Effective Green, g (s)	24.3	78.5	46.2			24.3
Actuated g/C Ratio	0.31	1.00	0.59			0.31
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)	548	3200	1883			863
v/s Ratio Prot	0.10	0.34	c0.42			c0.25
v/s Ratio Perm						
v/c Ratio	0.32	0.34	0.72			0.80
Uniform Delay, d1	20.8	0.0	11.5			24.9
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	0.3	0.1	1.3			5.5
Delay (s)	21.1	0.1	12.8			30.4
Level of Service	C	A	B			C
Approach Delay (s)		3.0	12.8		30.4	
Approach LOS		A	B		C	

Intersection Summary

HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	78.5	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	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	79	840	1122	83	293	149
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	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	1600	1600	1583	1770	1583
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	1600	1600	1583	1770	1583
Peak-hour factor, PHF	0.88	0.88	0.86	0.86	0.90	0.90
Adj. Flow (vph)	90	955	1305	97	326	166
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	90	955	1305	97	326	166
Turn Type	Prot			Perm		Perm
Protected Phases	5	2	6		4	
Permitted Phases				6		4
Actuated Green, G (s)	5.8	98.0	88.0	88.0	21.8	21.8
Effective Green, g (s)	6.0	100.0	90.0	90.0	22.0	22.0
Actuated g/C Ratio	0.05	0.77	0.69	0.69	0.17	0.17
Clearance Time (s)	4.2	6.0	6.0	6.0	4.2	4.2
Vehicle Extension (s)	4.5	4.5	4.5	4.5	3.5	3.5
Lane Grp Cap (vph)	82	1231	1108	1096	300	268
v/s Ratio Prot	c0.05	0.60	c0.82		c0.18	
v/s Ratio Perm				0.06		0.10
v/c Ratio	1.10	0.78	1.18	0.09	1.09	0.62
Uniform Delay, d1	62.0	8.6	20.0	6.6	54.0	50.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	128.4	3.5	89.6	0.1	77.1	4.4
Delay (s)	190.4	12.1	109.6	6.6	131.1	54.5
Level of Service	F	B	F	A	F	D
Approach Delay (s)		27.4	102.5		105.3	
Approach LOS		C	F		F	

Intersection Summary

HCM Average Control Delay	76.3	HCM Level of Service	E
HCM Volume to Capacity ratio	1.16		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	88.6%	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)	43	1026	64	13	1071	18	70	5	30	34	4	64
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	1625			1783	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.69	1.00			0.72	1.00
Satd. Flow (perm)	1770	1600	1583	1770	1600	1583	1280	1625			1334	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.91	0.91	0.91	0.75	0.75	0.75	0.61	0.61	0.61
Adj. Flow (vph)	46	1103	69	14	1177	20	93	7	40	56	7	105
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	46	1103	69	14	1177	20	93	47	0	0	63	105
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)	5.0	112.1	112.1	1.5	108.6	108.6	15.3	15.3			15.3	15.3
Effective Green, g (s)	4.7	114.1	114.1	1.2	110.6	110.6	15.4	15.4			15.4	15.4
Actuated g/C Ratio	0.03	0.80	0.80	0.01	0.78	0.78	0.11	0.11			0.11	0.11
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)	58	1279	1266	15	1240	1227	138	175			144	171
v/s Ratio Prot	c0.03	c0.69		0.01	c0.74			0.03				
v/s Ratio Perm			0.04			0.01	c0.07				0.05	0.07
v/c Ratio	0.79	0.86	0.05	0.93	0.95	0.02	0.67	0.27			0.44	0.61
Uniform Delay, d1	68.5	9.2	3.0	70.7	13.7	3.7	61.2	58.5			59.6	60.8
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	51.1	6.4	0.0	197.1	15.0	0.0	12.2	0.8			2.1	6.4
Delay (s)	119.7	15.7	3.0	267.8	28.7	3.7	73.5	59.3			61.7	67.2
Level of Service	F	B	A	F	C	A	E	E			E	E
Approach Delay (s)		18.9			31.0			68.7			65.1	
Approach LOS		B			C			E			E	

Intersection Summary

HCM Average Control Delay	29.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	142.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	950	140	189	885	217	359
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	0.97	0.97	0.89	0.89	0.74	0.74
Adj. Flow (vph)	979	144	212	994	293	485
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	979	144	212	994	293	485
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)	73.0	73.0	15.3	92.0	38.3	38.3
Effective Green, g (s)	75.0	75.0	15.0	94.0	38.0	38.0
Actuated g/C Ratio	0.54	0.54	0.11	0.67	0.27	0.27
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)	857	848	190	1074	480	430
v/s Ratio Prot	c0.61		c0.12	0.62	0.17	
v/s Ratio Perm		0.09				c0.31
v/c Ratio	1.14	0.17	1.12	0.93	0.61	1.13
Uniform Delay, d1	32.5	16.6	62.5	20.0	44.5	51.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	77.9	0.1	99.8	13.1	2.3	83.1
Delay (s)	110.4	16.7	162.3	33.0	46.8	134.1
Level of Service	F	B	F	C	D	F
Approach Delay (s)	98.4			55.7	101.2	
Approach LOS	F			E	F	

Intersection Summary

HCM Average Control Delay	82.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1193	116	153	996	78	158
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	1568
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1600	1583	1770	1600	1770	1568
Peak-hour factor, PHF	0.94	0.94	0.88	0.88	0.79	0.79
Adj. Flow (vph)	1269	123	174	1132	99	200
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1269	123	174	1132	99	200
Heavy Vehicles (%)	2%	2%	2%	2%	2%	3%
Turn Type		pm+ov	Prot			Perm
Protected Phases	2	3	1	6	3	
Permitted Phases		2				3
Actuated Green, G (s)	84.3	103.6	13.0	101.0	19.3	19.3
Effective Green, g (s)	86.3	103.0	12.7	103.0	19.0	19.0
Actuated g/C Ratio	0.66	0.79	0.10	0.79	0.15	0.15
Clearance Time (s)	6.0	3.7	3.7	6.0	3.7	3.7
Vehicle Extension (s)	3.0	2.5	2.5	3.0	2.5	2.5
Lane Grp Cap (vph)	1062	1254	173	1268	259	229
v/s Ratio Prot	c0.79	0.01	c0.10	0.71	0.06	
v/s Ratio Perm		0.06				c0.13
v/c Ratio	1.19	0.10	1.01	0.89	0.38	0.87
Uniform Delay, d1	21.9	3.0	58.6	9.6	50.2	54.3
Progression Factor	1.00	1.00	1.07	0.58	1.00	1.00
Incremental Delay, d2	97.1	0.0	47.9	4.9	0.7	28.4
Delay (s)	118.9	3.1	110.9	10.5	50.9	82.7
Level of Service	F	A	F	B	D	F
Approach Delay (s)	108.7			23.9	72.2	
Approach LOS	F			C	E	

Intersection Summary

HCM Average Control Delay	68.1	HCM Level of Service	E
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.6%	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	1257	106	124	1079	1	68	2	88	0	0	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
Lane Util. Factor	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			0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00			1.00
Satd. Flow (prot)	1770	1600	1583	1736	1600			1777	1583			1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.95	1.00			1.00
Satd. Flow (perm)	1770	1600	1583	1736	1600			1777	1583			1583
Peak-hour factor, PHF	0.91	0.91	0.91	0.93	0.93	0.93	0.76	0.76	0.76	0.50	0.50	0.50
Adj. Flow (vph)	2	1381	116	133	1160	1	89	3	116	0	0	4
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	2	1381	116	133	1161	0	0	92	116	0	0	4
Heavy Vehicles (%)	2%	2%	2%	4%	2%	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	79.5	79.5	20.6	98.8			7.3	7.3			5.5
Effective Green, g (s)	1.0	81.5	81.5	20.3	100.8			7.0	7.0			5.2
Actuated g/C Ratio	0.01	0.63	0.63	0.16	0.78			0.05	0.05			0.04
Clearance Time (s)	3.7	6.0	6.0	3.7	6.0			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
Lane Grp Cap (vph)	14	1003	992	271	1241			96	85			63
v/s Ratio Prot	0.00	c0.86		c0.08	c0.73			0.05				
v/s Ratio Perm			0.07						c0.07			c0.00
v/c Ratio	0.14	1.38	0.12	0.49	0.94			0.96	1.36			0.06
Uniform Delay, d1	64.1	24.2	9.8	50.1	11.9			61.4	61.5			60.1
Progression Factor	1.22	0.64	0.47	1.00	1.00			1.00	1.00			1.00
Incremental Delay, d2	0.4	170.2	0.0	1.0	14.1			77.4	222.6			0.3
Delay (s)	78.8	185.6	4.6	51.1	26.1			138.7	284.1			60.4
Level of Service	E	F	A	D	C			F	F			E
Approach Delay (s)		171.5			28.7			219.8			60.4	
Approach LOS		F			C			F			E	

Intersection Summary

HCM Average Control Delay	113.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	86.9%	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)	20	0	1	138	193	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	172	222	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	418	243	264			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	418	243	264			
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)	591	796	1300			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	28	174	264
Volume Left	28	1	0
Volume Right	0	0	43
cSH	591	1300	1700
Volume to Capacity	0.05	0.00	0.16
Queue Length 95th (ft)	4	0	0
Control Delay (s)	11.4	0.1	0.0
Lane LOS	B	A	
Approach Delay (s)	11.4	0.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	22.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	61	1284	1161	42	2	43
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.91	0.91	0.93	0.93	0.80	0.80
Hourly flow rate (vph)	67	1411	1248	45	2	54
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	1294				2793	1248
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1294				2793	1248
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	87				86	75
cM capacity (veh/h)	536				18	211

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	67	1411	1248	45	2	54
Volume Left	67	0	0	0	2	0
Volume Right	0	0	0	45	0	54
cSH	536	1700	1700	1700	18	211
Volume to Capacity	0.13	0.83	0.73	0.03	0.14	0.25
Queue Length 95th (ft)	11	0	0	0	10	24
Control Delay (s)	12.7	0.0	0.0	0.0	235.8	27.8
Lane LOS	B				F	D
Approach Delay (s)	0.6		0.0		37.0	
Approach LOS					E	

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
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)	144	585	0	0	199	218	64	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	0.95	0.95	0.95	0.90	0.90	0.90	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	616	0	0	221	242	70	1	145	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	152	616	0	0	221	242	0	71	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)	8.3	35.3			23.3	23.3		9.4	9.4			
Effective Green, g (s)	8.0	37.3			25.3	25.3		10.3	10.3			
Actuated g/C Ratio	0.14	0.67			0.46	0.46		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)	252	1250			848	707		328	289			
v/s Ratio Prot	c0.09	c0.33			0.12							
v/s Ratio Perm						0.16		0.04	c0.09			
v/c Ratio	0.60	0.49			0.26	0.34		0.22	0.50			
Uniform Delay, d1	22.3	4.5			9.4	9.8		19.2	20.3			
Progression Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2	4.0	1.4			0.2	0.3		0.3	1.4			
Delay (s)	26.3	5.9			9.5	10.1		19.6	21.7			
Level of Service	C	A			A	B		B	C			
Approach Delay (s)		9.9			9.8			21.0			0.0	
Approach LOS		A			A			C			A	

Intersection Summary

HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	55.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	72.7%	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)	0	361	81	100	163	0	0	0	0	368	0	182
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		0.98		1.00	1.00						1.00	0.85
Flt Protected		1.00		0.95	1.00						0.95	1.00
Satd. Flow (prot)		1794		1770	1845						1770	1583
Flt Permitted		1.00		0.95	1.00						0.95	1.00
Satd. Flow (perm)		1794		1770	1845						1770	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.90	0.90	0.90	0.92	0.92	0.92	0.79	0.79	0.79
Adj. Flow (vph)	0	384	86	111	181	0	0	0	0	466	0	230
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	470	0	111	181	0	0	0	0	0	466	230
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)		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)		692		149	988						589	527
v/s Ratio Prot		c0.26		c0.06	0.10							
v/s Ratio Perm											0.26	0.15
v/c Ratio		0.68		0.74	0.18						0.79	0.44
Uniform Delay, d1		15.5		27.2	7.3						18.3	15.8
Progression Factor		1.00		1.00	1.00						1.00	1.00
Incremental Delay, d2		2.7		18.2	0.4						10.4	2.6
Delay (s)		18.2		45.3	7.7						28.8	18.4
Level of Service		B		D	A						C	B
Approach Delay (s)		18.2			22.0			0.0			25.3	
Approach LOS		B			C			A			C	

Intersection Summary

HCM Average Control Delay	22.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	60.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

16: Spreckels Blvd. & Hwy 68 WB Ramps

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	3	5	277	6	0	0	0	0	88	1	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.69	0.69	0.69	0.90	0.90	0.90	0.92	0.92	0.92	0.74	0.74	0.74
Hourly flow rate (vph)	0	4	7	308	7	0	0	0	0	119	1	4
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			12			635	630	8	630	634	7
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	7			12			635	630	8	630	634	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			81			100	100	100	63	100	100
cM capacity (veh/h)	1614			1601			331	322	1074	325	320	1076

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	12	314	124
Volume Left	0	308	119
Volume Right	7	0	4
cSH	1700	1601	333
Volume to Capacity	0.01	0.19	0.37
Queue Length 95th (ft)	0	18	42
Control Delay (s)	0.0	7.7	22.1
Lane LOS		A	C
Approach Delay (s)	0.0	7.7	22.1
Approach LOS			C

Intersection Summary			
Average Delay	11.5		
Intersection Capacity Utilization	34.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	91	0	0	276	7	116
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.84	0.84	0.71	0.71
Hourly flow rate (vph)	105	0	0	329	10	163
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			105		433	105
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			105		433	105
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	83
cM capacity (veh/h)			1487		580	934

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	105	329	10	163
Volume Left	0	0	10	0
Volume Right	0	0	0	163
cSH	1700	1700	580	934
Volume to Capacity	0.06	0.19	0.02	0.17
Queue Length 95th (ft)	0	0	1	16
Control Delay (s)	0.0	0.0	11.3	9.7
Lane LOS			B	A
Approach Delay (s)	0.0	0.0	9.8	
Approach LOS			A	

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	24.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Volume (veh/h)	6	201	267	138	0	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.73	0.73	0.90	0.90	0.50	0.50
Hourly flow rate (vph)	8	275	297	153	0	18
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	450				588	297
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	450				588	297
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)	1110				468	743

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1
Volume Total	8	275	297	153	18
Volume Left	8	0	0	0	0
Volume Right	0	0	0	153	18
cSH	1110	1700	1700	1700	186
Volume to Capacity	0.01	0.16	0.17	0.09	0.10
Queue Length 95th (ft)	1	0	0	0	8
Control Delay (s)	8.3	0.0	0.0	0.0	26.5
Lane LOS	A				D
Approach Delay (s)	0.2		0.0		26.5
Approach LOS					D

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	24.1%	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)	343	348	186	603	485	124	234	673	451	95	740	208
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	0.97		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	1559	3433	3420		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	1559	3433	3420		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)	373	378	202	655	527	135	254	732	490	103	804	226
RTOR Reduction (vph)	0	0	161	0	21	0	0	0	316	0	0	159
Lane Group Flow (vph)	373	378	41	655	641	0	254	732	174	103	804	67
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)	15.7	20.8	20.8	20.7	25.8		16.5	37.0	37.0	11.6	32.1	32.1
Effective Green, g (s)	15.4	22.1	22.1	20.4	27.1		16.2	38.3	38.3	11.3	33.4	32.1
Actuated g/C Ratio	0.14	0.20	0.20	0.19	0.25		0.15	0.35	0.35	0.10	0.31	0.30
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)	489	724	319	648	857		265	1254	553	185	1093	463
v/s Ratio Prot	0.11	0.11		c0.19	c0.19		c0.14	0.21		0.06	c0.23	
v/s Ratio Perm			0.03						0.11			0.04
v/c Ratio	0.76	0.52	0.13	1.01	0.75		0.96	0.58	0.32	0.56	0.74	0.14
Uniform Delay, d1	44.6	38.3	35.1	43.8	37.4		45.6	28.4	25.4	46.0	33.4	27.9
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	6.9	0.8	0.2	38.1	3.7		43.4	2.0	1.5	3.6	4.4	0.7
Delay (s)	51.5	39.1	35.4	81.9	41.1		89.0	30.4	26.9	49.6	37.8	28.6
Level of Service	D	D	D	F	D		F	C	C	D	D	C
Approach Delay (s)		43.2			61.4			39.3			37.0	
Approach LOS		D			E			D			D	

Intersection Summary

HCM Average Control Delay	45.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	108.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.3%	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 (veh/h)	147	278	1	6	281	118	0	1	1	157	1	64
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.87	0.87	0.87	0.82	0.82	0.82	0.50	0.50	0.50	0.80	0.80	0.80
Hourly flow rate (vph)	169	320	1	7	343	144	0	2	2	196	1	80
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	487			321			1016	1159	320	1090	1088	415
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	487			321			1016	1159	320	1090	1088	415
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 %	84			99			100	99	100	0	99	87
cM capacity (veh/h)	1076			1239			165	164	721	166	181	638

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	169	321	7	487	4	278
Volume Left	169	0	7	0	0	196
Volume Right	0	1	0	144	2	80
cSH	1076	1700	1239	1700	267	219
Volume to Capacity	0.16	0.19	0.01	0.29	0.01	1.27
Queue Length 95th (ft)	14	0	0	0	1	362
Control Delay (s)	9.0	0.0	7.9	0.0	18.7	195.0
Lane LOS	A		A		C	F
Approach Delay (s)	3.1		0.1		18.7	195.0
Approach LOS					C	F

Intersection Summary			
Average Delay	44.1		
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	605	461	15	61	490	359	33	333	90	204	213	324
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	0.97		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	3522		1770	3539	1583	1770	3426		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	3522		1770	3539	1583	1770	3426		1770	1863	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.82	0.82	0.82	0.77	0.77	0.77	0.83	0.83	0.83
Adj. Flow (vph)	644	490	16	74	598	438	43	432	117	246	257	390
RTOR Reduction (vph)	0	0	0	0	0	257	0	0	0	0	0	251
Lane Group Flow (vph)	644	506	0	74	598	181	43	549	0	246	257	139
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)	21.0	36.8		5.3	20.6	20.6	3.4	19.0		16.8	32.9	32.9
Effective Green, g (s)	21.5	39.3		4.8	22.6	22.6	2.9	21.5		16.3	34.9	34.9
Actuated g/C Ratio	0.22	0.40		0.05	0.23	0.23	0.03	0.22		0.17	0.36	0.36
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)	754	1414		87	817	365	52	752		295	664	564
v/s Ratio Prot	c0.19	0.14		0.04	c0.17		0.02	c0.16		c0.14	0.14	
v/s Ratio Perm						0.11						0.09
v/c Ratio	0.85	0.36		0.85	0.73	0.50	0.83	0.73		0.83	0.39	0.25
Uniform Delay, d1	36.7	20.5		46.2	34.8	32.7	47.3	35.5		39.5	23.5	22.2
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	9.0	0.7		49.5	5.7	4.8	62.2	4.1		17.3	0.6	0.4
Delay (s)	45.7	21.2		95.7	40.6	37.5	109.4	39.6		56.8	24.2	22.6
Level of Service	D	C		F	D	D	F	D		E	C	C
Approach Delay (s)		34.9			43.0			44.7			32.5	
Approach LOS		C			D			D			C	

Intersection Summary

HCM Average Control Delay	38.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	97.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCS+: Two-Lane Highways Release 5.2

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	Existing 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	0.90	
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 2351 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	2623	pc/h
Highest directional split proportion (note-2)	1416	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	1.0	mi/h
Average travel speed, ATS	37.7	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	2612	pc/h
Highest directional split proportion (note-2)	1410	
Base percent time-spent-following, BPTSF	89.9	%
Adj.for directional distribution and no-passing zones, fd/np	2.3	
Percent time-spent-following, PTSF	92.2	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.82	
Peak 15-min vehicle-miles of travel, VMT15	914	veh-mi
Peak-hour vehicle-miles of travel, VMT60	3291	veh-mi
Peak 15-min total travel time, TT15	24.3	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.

HCS+: Two-Lane Highways Release 5.2

Two-Way Two-Lane Highway Segment Analysis

Analyst	JHO
Agency/Co.	Higgins Associates
Date Performed	12/4/2006
Analysis Time Period	Existing 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	1982	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	2163	pc/h
Highest directional split proportion (note-2)	1168	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	41.9	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	2154	pc/h
Highest directional split proportion (note-2)	1163	
Base percent time-spent-following, BPTSF	84.9	%
Adj.for directional distribution and no-passing zones, fd/np	3.8	
Percent time-spent-following, PTSF	88.8	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.68	
Peak 15-min vehicle-miles of travel, VMT15	323	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1189	veh-mi
Peak 15-min total travel time, TT15	7.7	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.

HCS+: Multilane Highways Release 5.2

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OPERATIONAL ANALYSIS

Analyst:	SF
Agency/Co:	Higgins Associates
Date:	3/13/08
Analysis Period:	Existing 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	1540	vph	1211	vph
Peak-hour factor, PHF	0.86		0.86	
Peak 15-minute volume, v15	448		352	
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	913	pcphpl	718	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	913	pcphpl	718	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	15.2	pc/mi/ln	12.0	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	Existing 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	1174	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,	0.998	
Two-way flow rate,(note-1) vp	1279	pc/h
Highest directional split proportion (note-2)	716	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	1.9	mi/h
Average travel speed, ATS	45.9	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	1276	pc/h
Highest directional split proportion (note-2)	715	
Base percent time-spent-following, BPTSF	67.4	%
Adj.for directional distribution and no-passing zones, fd/np	9.4	
Percent time-spent-following, PTSF	76.8	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.40	
Peak 15-min vehicle-miles of travel, VMT15	236	veh-mi
Peak-hour vehicle-miles of travel, VMT60	869	veh-mi
Peak 15-min total travel time, TT15	5.1	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+: 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	Existing 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	854	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	939	pc/h
Highest directional split proportion (note-2)	488	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	2.7	mi/h
Average travel speed, ATS	48.2	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	934	pc/h
Highest directional split proportion (note-2)	486	
Base percent time-spent-following, BPTSF	56.0	%
Adj.for directional distribution and no-passing zones, fd/np	13.6	
Percent time-spent-following, PTSF	69.6	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.29	
Peak 15-min vehicle-miles of travel, VMT15	418	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1537	veh-mi
Peak 15-min total travel time, TT15	8.7	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	SF
Agency/Co.	Higgins Associates
Date Performed	3/14/2008
Analysis Time Period	Existing 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	616	veh/h	
Directional split	56 / 44	%	

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,	0.994	
Two-way flow rate,(note-1) vp	674	pc/h
Highest directional split proportion (note-2)	377	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	3.6	mi/h
Average travel speed, ATS	50.5	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	0.997	
Two-way flow rate,(note-1) vp	672	pc/h
Highest directional split proportion (note-2)	376	
Base percent time-spent-following, BPTSF	44.6	%
Adj.for directional distribution and no-passing zones, fd/np	18.5	
Percent time-spent-following, PTSF	63.1	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.21	
Peak 15-min vehicle-miles of travel, VMT15	352	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1294	veh-mi
Peak 15-min total travel time, TT15	7.0	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	Existing 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	2549	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	2782	pc/h
Highest directional split proportion (note-2)	1474	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	36.5	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	2771	pc/h
Highest directional split proportion (note-2)	1469	
Base percent time-spent-following, BPTSF	91.2	%
Adj.for directional distribution and no-passing zones, fd/np	2.1	
Percent time-spent-following, PTSF	93.4	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.87	
Peak 15-min vehicle-miles of travel, VMT15	970	veh-mi
Peak-hour vehicle-miles of travel, VMT60	3569	veh-mi
Peak 15-min total travel time, TT15	26.6	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.

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	Existing 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	2489	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	2716	pc/h
Highest directional split proportion (note-2)	1412	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	0.9	mi/h
Average travel speed, ATS	37.7	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	2705	pc/h
Highest directional split proportion (note-2)	1407	
Base percent time-spent-following, BPTSF	90.7	%
Adj.for directional distribution and no-passing zones, fd/np	2.2	
Percent time-spent-following, PTSF	92.9	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.85	
Peak 15-min vehicle-miles of travel, VMT15	406	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1493	veh-mi
Peak 15-min total travel time, TT15	10.8	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+: Multilane Highways Release 5.2

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OPERATIONAL ANALYSIS

Analyst:	SF
Agency/Co:	Higgins Associates
Date:	3/14/2008
Analysis Period:	Existing 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	1650	vph	1720	vph
Peak-hour factor, PHF	0.88		0.91	
Peak 15-minute volume, v15	469		473	
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	956	pcphpl	954	pcphpl

RESULTS

Direction	1		2	
Flow rate, vp	956	pcphpl	954	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	15.9	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	Existing 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	1177	veh/h		
Directional split	66 /	34 %		

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	1282	pc/h
Highest directional split proportion (note-2)	846	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	1.9	mi/h
Average travel speed, ATS	45.9	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	1279	pc/h
Highest directional split proportion (note-2)	844	
Base percent time-spent-following, BPTSF	67.5	%
Adj.for directional distribution and no-passing zones, fd/np	9.5	
Percent time-spent-following, PTSF	77.0	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.40	
Peak 15-min vehicle-miles of travel, VMT15	237	veh-mi
Peak-hour vehicle-miles of travel, VMT60	871	veh-mi
Peak 15-min total travel time, TT15	5.2	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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Two-Way Two-Lane Highway Segment Analysis

Analyst	JHO
Agency/Co.	Higgins Associates
Date Performed	1/16/2007
Analysis Time Period	Existing 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	841	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	925	pc/h
Highest directional split proportion (note-2)	481	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	2.8	mi/h
Average travel speed, ATS	48.3	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	920	pc/h
Highest directional split proportion (note-2)	478	
Base percent time-spent-following, BPTSF	55.5	%
Adj.for directional distribution and no-passing zones, fd/np	13.7	
Percent time-spent-following, PTSF	69.2	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.29	
Peak 15-min vehicle-miles of travel, VMT15	411	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1514	veh-mi
Peak 15-min total travel time, TT15	8.5	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	SF
Agency/Co.	Higgins Associates
Date Performed	3/14/2008
Analysis Time Period	Existing 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 569 veh/h
Directional split 56 / 44 %

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,	0.994	
Two-way flow rate,(note-1) vp	622	pc/h
Highest directional split proportion (note-2)	348	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	3.8	mi/h
Average travel speed, ATS	50.6	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	0.997	
Two-way flow rate,(note-1) vp	620	pc/h
Highest directional split proportion (note-2)	347	
Base percent time-spent-following, BPTSF	42.0	%
Adj.for directional distribution and no-passing zones, fd/np	20.0	
Percent time-spent-following, PTSF	62.1	%

Level of Service and Other Performance Measures

Level of service, LOS	C	
Volume to capacity ratio, v/c	0.19	
Peak 15-min vehicle-miles of travel, VMT15	325	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1195	veh-mi
Peak 15-min total travel time, TT15	6.4	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.