Appendix J

Level of Service Calculation Worksheets

Background + Alternative Project Conditions

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1190	72	45	989	149	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1600	1583	1770	1600	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1600	1583	1770	1600	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1293	78	49	1075	162	64
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1293	78	49	1075	162	64
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	80.1	80.1	3.4	87.2	13.4	13.4
Effective Green, g (s)	82.1	82.1	3.1	89.2	13.6	13.6
Actuated g/C Ratio	0.74	0.74	0.03	0.81	0.12	0.12
Clearance Time (s)	6.0	6.0	3.7	6.0	4.2	4.2
Vehicle Extension (s)	1.5	1.5	3.0	1.5	2.0	2.0
Lane Grp Cap (vph)	1186	1173	50	1288	217	194
v/s Ratio Prot	c0.81		0.03	c0.67	c0.09	
v/s Ratio Perm		0.05				0.04
v/c Ratio	1.09	0.07	0.98	0.83	0.75	0.33
Uniform Delay, d1	14.4	3.9	53.8	6.4	46.9	44.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	54.3	0.0	118.5	4.6	11.5	0.4
Delay (s)	68.7	3.9	172.3	11.0	58.5	44.8
Level of Service	E	A	F	B	E	D
Approach Delay (s)	65.0			18.1	54.6	
Approach LOS	E			B	D	

Intersection Summary

HCM Average Control Delay	44.7	HCM Level of Service	D
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	110.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	141	1083	25	95	897	244	71	31	77	97	26	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.94			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.96	1.00
Satd. Flow (prot)	1770	1600	1553	1703	1600	1583		1714			1785	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.71			0.55	1.00
Satd. Flow (perm)	1770	1863	1553	1703	1863	1583		1234			1015	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	153	1177	27	103	975	265	77	34	84	105	28	73
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	153	1177	27	103	975	265	0	195	0	0	133	73
Heavy Vehicles (%)	2%	2%	4%	6%	2%	2%	3%	2%	2%	2%	4%	2%
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	12.2	72.6	72.6	8.0	68.4	68.4		21.0			21.0	21.0
Effective Green, g (s)	11.7	74.6	74.6	7.5	70.4	70.4		21.0			21.0	21.0
Actuated g/C Ratio	0.10	0.65	0.65	0.07	0.61	0.61		0.18			0.18	0.18
Clearance Time (s)	3.5	6.0	6.0	3.5	6.0	6.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	180	1037	1007	111	979	968		225			185	289
v/s Ratio Prot	c0.09	c0.74		0.06	0.61							
v/s Ratio Perm			0.02			0.17		c0.16			0.13	0.05
v/c Ratio	0.85	1.14	0.03	0.93	1.00	0.27		0.87			0.72	0.25
Uniform Delay, d1	50.8	20.2	7.3	53.5	22.2	10.4		45.7			44.3	40.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	29.4	72.9	0.0	62.3	27.8	0.7		27.6			12.5	0.5
Delay (s)	80.2	93.2	7.3	115.8	50.0	11.1		73.3			56.8	40.8
Level of Service	F	F	A	F	D	B		E			E	D
Approach Delay (s)		90.0			47.4			73.3			51.1	
Approach LOS		F			D			E			D	

Intersection Summary

HCM Average Control Delay	67.9	HCM Level of Service	E
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	115.1	Sum of lost time (s)	8.0
Intersection Capacity Utilization	89.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	147	1099	11	17	1028	437	14	11	25	496	21	196
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		0.97	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.90		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3200		1770	3200	1568	1770	1669		3433	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3200		1770	3200	1568	1770	1669		3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	160	1195	12	18	1117	475	15	12	27	539	23	213
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	160	1207	0	18	1117	475	15	39	0	539	23	213
Heavy Vehicles (%)	2%	2%	2%	2%	4%	3%	2%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot		pm+ov	Split			Split		Perm
Protected Phases	5	2		1	6	7	8	8		7	7	
Permitted Phases						6						7
Actuated Green, G (s)	8.1	37.8		0.7	30.4	46.7	2.2	2.2		16.3	16.3	16.3
Effective Green, g (s)	8.3	39.8		0.9	32.4	49.3	2.4	2.4		17.6	17.6	17.6
Actuated g/C Ratio	0.11	0.52		0.01	0.42	0.64	0.03	0.03		0.23	0.23	0.23
Clearance Time (s)	4.2	6.0		4.2	6.0	5.3	4.2	4.2		5.3	5.3	5.3
Vehicle Extension (s)	2.5	2.5		3.0	2.5	2.5	2.0	2.0		2.5	2.5	2.5
Lane Grp Cap (vph)	192	1660		21	1352	1008	55	52		788	427	363
v/s Ratio Prot	c0.09	0.38		0.01	c0.35	0.11	0.01	c0.02		c0.16	0.01	
v/s Ratio Perm						0.19						0.13
v/c Ratio	0.83	0.73		0.86	0.83	0.47	0.27	0.75		0.68	0.05	0.59
Uniform Delay, d1	33.5	14.3		37.8	19.7	7.0	36.3	36.9		27.0	23.1	26.3
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	25.1	1.5		129.6	4.2	0.3	1.0	41.1		2.3	0.0	2.0
Delay (s)	58.6	15.8		167.4	23.8	7.3	37.3	77.9		29.3	23.1	28.3
Level of Service	E	B		F	C	A	D	E		C	C	C
Approach Delay (s)		20.8			20.6			66.6			28.8	
Approach LOS		C			C			E			C	

Intersection Summary

HCM Average Control Delay	23.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	76.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	606	1014	1307	10	0	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0			4.0
Lane Util. Factor	1.00	0.95	0.95			0.88
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	1600	3200			2760
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1770	1600	3200			2760
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	659	1102	1421	11	0	190
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	659	1102	1432	0	0	190
Heavy Vehicles (%)	2%	2%	3%	2%	2%	3%
Turn Type	Prot					Over
Protected Phases	5	2	6			5
Permitted Phases						
Actuated Green, G (s)	31.3	79.6	37.7			31.3
Effective Green, g (s)	31.9	79.6	39.7			31.9
Actuated g/C Ratio	0.40	1.00	0.50			0.40
Clearance Time (s)	4.6	2.0	6.0			4.6
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	709	1600	1596			1106
v/s Ratio Prot	c0.37	0.69	c0.45			0.07
v/s Ratio Perm						
v/c Ratio	0.93	0.69	0.90			0.17
Uniform Delay, d1	22.8	0.0	18.1			15.3
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	18.5	1.3	7.0			0.1
Delay (s)	41.2	1.3	25.1			15.4
Level of Service	D	A	C			B
Approach Delay (s)		16.2	25.1		15.4	
Approach LOS		B	C		B	

Intersection Summary

HCM Average Control Delay	19.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	79.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	253	759	3	2	1170	394	9	2	5	113	1	139
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1600	1583	1770	1600	1583	1770	1663		3433	1863	1568
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1600	1583	1770	1600	1583	1770	1663		3433	1863	1568
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	275	825	3	2	1272	428	10	2	5	123	1	151
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	275	825	3	2	1272	428	10	7	0	123	1	151
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	3%
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6						4
Actuated Green, G (s)	17.8	111.3	111.3	0.8	94.1	94.1	1.5	3.1		16.7	17.9	17.9
Effective Green, g (s)	18.0	113.3	113.3	0.8	96.1	96.1	1.7	3.1		16.7	18.1	18.1
Actuated g/C Ratio	0.12	0.76	0.76	0.01	0.64	0.64	0.01	0.02		0.11	0.12	0.12
Clearance Time (s)	4.2	6.0	6.0	4.0	6.0	6.0	4.2	4.0		4.0	4.2	4.2
Vehicle Extension (s)	4.5	4.5	4.5	3.0	4.5	4.5	4.5	3.0		3.0	3.5	3.5
Lane Grp Cap (vph)	213	1209	1196	9	1026	1015	20	34		382	225	189
v/s Ratio Prot	c0.16	0.52		0.00	c0.80		0.01	0.00		c0.04	0.00	
v/s Ratio Perm			0.00			0.27						c0.10
v/c Ratio	1.29	0.68	0.00	0.22	1.24	0.42	0.50	0.21		0.32	0.00	0.80
Uniform Delay, d1	66.0	9.2	4.5	74.2	26.9	13.2	73.7	72.2		61.4	58.0	64.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	161.4	1.9	0.0	12.1	116.3	0.5	30.2	3.0		0.5	0.0	21.1
Delay (s)	227.4	11.1	4.5	86.4	143.2	13.7	103.8	75.2		61.9	58.0	85.2
Level of Service	F	B	A	F	F	B	F	E		E	E	F
Approach Delay (s)		65.0			110.6			92.0			74.7	
Approach LOS		E			F			F			E	

Intersection Summary

HCM Average Control Delay	91.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	149.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	95.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	799	46	21	1438	33	51	2	28	29	1	77
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98	1.00	0.98			1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.95	1.00
Satd. Flow (prot)	1770	1600	1583	1770	1600	1545	1770	1567			1772	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.74	1.00			0.73	1.00
Satd. Flow (perm)	1770	1600	1583	1770	1600	1545	1370	1567			1348	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	35	868	50	23	1563	36	55	2	30	32	1	84
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	35	868	50	23	1563	36	55	32	0	0	33	84
Confl. Peds. (#/hr)				1		1			1	1		
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	3.1	107.5	107.5	3.8	108.2	108.2	12.5	12.5			12.5	12.5
Effective Green, g (s)	2.8	109.5	109.5	3.5	110.2	110.2	12.6	12.6			12.6	12.6
Actuated g/C Ratio	0.02	0.80	0.80	0.03	0.80	0.80	0.09	0.09			0.09	0.09
Clearance Time (s)	3.7	6.0	6.0	3.7	6.0	6.0	4.1	4.1			4.1	4.1
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	36	1273	1260	45	1281	1237	125	143			123	145
v/s Ratio Prot	c0.02	0.54		0.01	c0.98			0.02				
v/s Ratio Perm			0.03			0.02	0.04				0.02	c0.05
v/c Ratio	0.97	0.68	0.04	0.51	1.22	0.03	0.44	0.22			0.27	0.58
Uniform Delay, d1	67.4	6.3	3.0	66.2	13.7	2.8	59.2	58.0			58.2	60.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	138.2	1.7	0.0	9.5	106.3	0.0	2.5	0.8			1.2	5.5
Delay (s)	205.6	7.9	3.0	75.7	120.0	2.8	61.6	58.8			59.4	65.5
Level of Service	F	A	A	E	F	A	E	E			E	E
Approach Delay (s)		14.9			116.8			60.6			63.8	
Approach LOS		B			F			E			E	

Intersection Summary

HCM Average Control Delay	77.9	HCM Level of Service	E
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	137.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	94.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	730	136	240	1286	206	247
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.97	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1600	1583	3433	1600	1770	1546
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1600	1583	3433	1600	1770	1546
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	793	148	261	1398	224	268
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	793	148	261	1398	224	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)	75.5	75.5	11.8	91.0	19.3	19.3
Effective Green, g (s)	77.5	77.5	11.5	93.0	19.0	19.0
Actuated g/C Ratio	0.65	0.65	0.10	0.78	0.16	0.16
Clearance Time (s)	6.0	6.0	3.7	6.0	3.7	3.7
Vehicle Extension (s)	2.5	2.5	2.5	2.5	3.0	3.0
Lane Grp Cap (vph)	1033	1022	329	1240	280	245
v/s Ratio Prot	0.50		0.08	c0.87	0.13	
v/s Ratio Perm		0.09				c0.17
v/c Ratio	0.77	0.14	0.79	1.13	0.80	1.09
Uniform Delay, d1	14.9	8.3	53.1	13.5	48.7	50.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.3	0.0	12.0	68.1	15.0	84.9
Delay (s)	18.3	8.4	65.1	81.6	63.7	135.4
Level of Service	B	A	E	F	E	F
Approach Delay (s)	16.7			79.0	102.7	
Approach LOS	B			E	F	

Intersection Summary

HCM Average Control Delay	63.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	928	56	88	1366	13	160	1	199	8	1	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.96	1.00
Satd. Flow (prot)	1770	1600	1583	3400	1600			1757	1583		1783	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.96	1.00
Satd. Flow (perm)	1770	1600	1583	3400	1600			1757	1583		1783	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	1009	61	96	1485	14	174	1	216	9	1	5
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	2	1009	61	96	1499	0	0	175	216	0	10	5
Heavy Vehicles (%)	2%	2%	2%	3%	2%	2%	3%	2%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Split		Perm	Split		Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	1.0	92.1	92.1	7.4	98.2			29.8	29.8		3.0	3.0
Effective Green, g (s)	1.0	94.1	94.1	7.1	100.2			29.8	29.8		3.0	3.0
Actuated g/C Ratio	0.01	0.63	0.63	0.05	0.67			0.20	0.20		0.02	0.02
Clearance Time (s)	4.0	6.0	6.0	3.7	6.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	2.5	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	12	1004	993	161	1069			349	314		36	32
v/s Ratio Prot	0.00	0.63		c0.03	c0.94			0.10			c0.01	
v/s Ratio Perm			0.04						c0.14			0.00
v/c Ratio	0.17	1.00	0.06	0.60	1.40			0.50	0.69		0.28	0.16
Uniform Delay, d1	74.1	28.0	10.8	70.0	24.9			53.5	55.8		72.4	72.3
Progression Factor	1.00	1.00	1.00	0.98	1.34			1.00	1.00		1.00	1.00
Incremental Delay, d2	6.5	29.6	0.1	0.5	181.5			1.1	6.1		4.2	2.3
Delay (s)	80.6	57.6	11.0	69.4	215.0			54.6	61.9		76.6	74.5
Level of Service	F	E	B	E	F			D	E		E	E
Approach Delay (s)		55.0			206.2			58.7			75.9	
Approach LOS		D			F			E			E	

Intersection Summary

HCM Average Control Delay	134.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	94.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	1069	36	71	1343	1	111	1	144	1	1	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00			1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	0.97		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.98	1.00
Satd. Flow (prot)	1770	1600	1583	3273	1600			1775	1542		1817	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.98	1.00
Satd. Flow (perm)	1770	1600	1583	3273	1600			1775	1542		1817	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	1162	39	77	1460	1	121	1	157	1	1	1
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	1	1162	39	77	1461	0	0	122	157	0	2	1
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	2%	2%	7%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Split		Perm	Split		Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases			2						3			4
Actuated Green, G (s)	1.2	104.9	104.9	10.4	114.1			12.3	12.3		5.3	5.3
Effective Green, g (s)	0.9	106.9	106.9	10.1	116.1			12.0	12.0		5.0	5.0
Actuated g/C Ratio	0.01	0.71	0.71	0.07	0.77			0.08	0.08		0.03	0.03
Clearance Time (s)	3.7	6.0	6.0	3.7	6.0			3.7	3.7		3.7	3.7
Vehicle Extension (s)	3.0	3.0	3.0	2.5	3.0			2.5	2.5		2.5	2.5
Lane Grp Cap (vph)	11	1140	1128	220	1238			142	123		61	53
v/s Ratio Prot	0.00	0.73		c0.02	c0.91			0.07			c0.00	
v/s Ratio Perm			0.02						c0.10			0.00
v/c Ratio	0.09	1.02	0.03	0.35	1.18			0.86	1.28		0.03	0.02
Uniform Delay, d1	74.1	21.5	6.3	66.8	17.0			68.2	69.0		70.2	70.1
Progression Factor	0.85	1.15	1.36	1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	1.4	21.4	0.0	0.7	89.7			36.7	173.0		0.2	0.1
Delay (s)	64.1	46.3	8.6	67.5	106.6			104.9	242.0		70.3	70.2
Level of Service	E	D	A	E	F			F	F		E	E
Approach Delay (s)		45.1			104.7			182.0			70.3	
Approach LOS		D			F			F			E	

Intersection Summary

HCM Average Control Delay	88.1	HCM Level of Service	F
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	90.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	27	0	0	0	0	1	2	227	0	0	100	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.61	0.92	0.61	0.92	0.92	0.92	0.83	0.83	0.92	0.92	0.59	0.59
Hourly flow rate (vph)	44	0	0	0	0	1	2	273	0	0	169	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	455	454	175	454	460	273	181			273		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	455	454	175	454	460	273	181			273		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	91	100	100	100	100	100	100			100		
cM capacity (veh/h)	514	501	868	516	497	765	1394			1290		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	44	1	276	181
Volume Left	44	0	2	0
Volume Right	0	1	0	12
cSH	514	765	1394	1290
Volume to Capacity	0.09	0.00	0.00	0.00
Queue Length 95th (ft)	7	0	0	0
Control Delay (s)	12.7	9.7	0.1	0.0
Lane LOS	B	A	A	
Approach Delay (s)	12.7	9.7	0.1	0.0
Approach LOS	B	A		

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	28.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	17	1196	1056	7	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	1359	1160	8	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	1169				2560	1162
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1169				2560	1162
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	97				95	0
cM capacity (veh/h)	597				28	237

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	19	1359	1160	8	1	513
Volume Left	19	0	0	0	1	0
Volume Right	0	0	0	8	0	513
cSH	597	1700	1700	1700	28	237
Volume to Capacity	0.03	0.80	0.68	0.00	0.05	2.17
Queue Length 95th (ft)	3	0	0	0	4	985
Control Delay (s)	11.2	0.0	0.0	0.0	140.2	571.4
Lane LOS	B				F	F
Approach Delay (s)	0.2		0.0		570.2	
Approach LOS					F	

Intersection Summary			
Average Delay	95.9		
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	27	1	6	0	23	11	62	23	0	24	24	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	1	9	0	52	25	124	46	0	29	29	272

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	50	77	124	46	29	301
Volume Left (vph)	40	0	124	0	29	0
Volume Right (vph)	9	25	0	0	0	272
Hadj (s)	0.11	-0.16	0.53	0.03	0.58	-0.60
Departure Headway (s)	5.3	4.9	5.6	5.1	5.6	4.4
Degree Utilization, x	0.07	0.11	0.19	0.07	0.04	0.37
Capacity (veh/h)	619	659	615	671	619	792
Control Delay (s)	8.7	8.5	8.8	7.3	7.7	8.8
Approach Delay (s)	8.7	8.5	8.4		8.7	
Approach LOS	A	A	A		A	

Intersection Summary			
Delay	8.6		
HCM Level of Service	A		
Intersection Capacity Utilization	37.2%	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)	32	12	42	359	5	39	18	203	11	26	29	6
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)	39	15	51	479	7	52	22	248	13	37	41	9

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	105	537	22	261	37	50
Volume Left (vph)	39	479	22	0	37	0
Volume Right (vph)	51	52	0	13	0	9
Hadj (s)	-0.18	0.15	0.60	0.00	0.53	-0.06
Departure Headway (s)	5.8	5.4	7.1	6.5	7.5	6.9
Degree Utilization, x	0.17	0.81	0.04	0.47	0.08	0.10
Capacity (veh/h)	565	537	472	509	440	479
Control Delay (s)	10.0	26.9	9.3	14.0	9.9	9.4
Approach Delay (s)	10.0	26.9	13.7		9.6	
Approach LOS	A	D	B		A	

Intersection Summary			
Delay	20.0		
HCM Level of Service	C		
Intersection Capacity Utilization	53.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	239	353	0	0	336	462	152	1	84	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0	4.0			
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00	0.99			
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1770	1792			1845	1583		1771	1562			
Flt Permitted	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	1770	1792			1845	1583		1771	1562			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	260	384	0	0	365	502	165	1	91	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	260	384	0	0	365	502	0	166	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)	17.9	68.2			46.6	46.6		13.9	13.9			
Effective Green, g (s)	17.6	70.2			48.6	48.6		14.8	14.8			
Actuated g/C Ratio	0.19	0.75			0.52	0.52		0.16	0.16			
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)	335	1353			964	827		282	249			
v/s Ratio Prot	c0.15	0.21			0.20							
v/s Ratio Perm						c0.32		0.09	0.06			
v/c Ratio	0.78	0.28			0.38	0.61		0.59	0.37			
Uniform Delay, d1	35.8	3.6			13.2	15.5		36.3	34.9			
Progression Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2	10.7	0.5			0.3	1.3		3.1	0.9			
Delay (s)	46.6	4.1			13.5	16.8		39.4	35.8			
Level of Service	D	A			B	B		D	D			
Approach Delay (s)		21.2			15.4			38.1			0.0	
Approach LOS		C			B			D			A	

Intersection Summary

HCM Average Control Delay	20.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	93.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	429	108	132	355	0	0	0	0	163	6	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0						4.0	4.0
Lane Util. Factor		1.00		1.00	1.00						1.00	1.00
Frpb, ped/bikes		1.00		1.00	1.00						1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00						1.00	1.00
Frt		0.97		1.00	1.00						1.00	0.85
Flt Protected		1.00		0.95	1.00						0.95	1.00
Satd. Flow (prot)		1754		1770	1845						1742	1524
Flt Permitted		1.00		0.95	1.00						0.95	1.00
Satd. Flow (perm)		1754		1770	1845						1742	1524
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	466	117	143	386	0	0	0	0	177	7	174
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	583	0	143	386	0	0	0	0	0	184	174
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	5%	7%	2%	3%	2%	2%	2%	2%	4%	2%	6%
Turn Type				Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases										4		4
Actuated Green, G (s)		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)		623		192	978						586	513
v/s Ratio Prot		c0.33		c0.08	0.21							
v/s Ratio Perm											0.11	c0.11
v/c Ratio		0.94		0.74	0.39						0.31	0.34
Uniform Delay, d1		18.7		25.9	8.4						14.8	14.9
Progression Factor		1.00		1.00	1.00						1.00	1.00
Incremental Delay, d2		21.5		14.5	1.2						1.4	1.8
Delay (s)		40.1		40.4	9.6						16.2	16.7
Level of Service		D		D	A						B	B
Approach Delay (s)		40.1			17.9			0.0			16.4	
Approach LOS		D			B			A			B	

Intersection Summary

HCM Average Control Delay	26.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	60.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	355	0	0	0	0	0	95	1	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	386	0	0	0	0	0	103	1	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	0			0			773	772	0	772	772	0
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	0			0			773	772	0	772	772	0
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	100			76			100	100	100	59	100	100
cM capacity (veh/h)	1623			1617			257	251	1085	253	251	1085

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	0	386	105
Volume Left	0	386	103
Volume Right	0	0	1
cSH	1700	1617	255
Volume to Capacity	0.00	0.24	0.41
Queue Length 95th (ft)	0	23	48
Control Delay (s)	0.0	7.9	28.8
Lane LOS		A	D
Approach Delay (s)	0.0	7.9	28.8
Approach LOS			D

Intersection Summary			
Average Delay	12.4		
Intersection Capacity Utilization	31.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	95	0	0	355	0	332
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	103	0	0	386	0	361
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			103		489	103
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			103		489	103
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	62
cM capacity (veh/h)			1489		538	946

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	103	386	0	361
Volume Left	0	0	0	0
Volume Right	0	0	0	361
cSH	1700	1700	1700	946
Volume to Capacity	0.06	0.23	0.00	0.38
Queue Length 95th (ft)	0	0	0	45
Control Delay (s)	0.0	0.0	0.0	11.1
Lane LOS			A	B
Approach Delay (s)	0.0	0.0	11.1	
Approach LOS			B	

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	32.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	4	423	355	83	0	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	460	386	90	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						3
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	476				854	386
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	476				854	386
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)	1086				328	662

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	4	460	386	90	0
Volume Left	4	0	0	0	0
Volume Right	0	0	0	90	0
cSH	1086	1700	1700	1700	1700
Volume to Capacity	0.00	0.27	0.23	0.05	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	8.3	0.0	0.0	0.0	0.0
Lane LOS	A				A
Approach Delay (s)	0.1		0.0		0.0
Approach LOS					A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	25.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	305	666	203	458	462	78	240	903	628	107	633	231
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	5.3
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1583	3433	3455		1770	3539	1583	1770	3539	1561
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1583	3433	3455		1770	3539	1583	1770	3539	1561
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	332	724	221	498	502	85	261	982	683	116	688	251
RTOR Reduction (vph)	0	0	96	0	12	0	0	0	217	0	0	180
Lane Group Flow (vph)	332	724	125	498	575	0	261	982	466	116	688	71
Confl. Peds. (#/hr)	2					2				2		2
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	14.2	26.4	26.4	17.9	30.1		18.8	41.8	41.8	9.3	32.3	32.3
Effective Green, g (s)	13.9	27.7	27.7	17.6	31.4		18.5	43.1	43.1	9.0	33.6	32.3
Actuated g/C Ratio	0.12	0.24	0.24	0.16	0.28		0.16	0.38	0.38	0.08	0.30	0.28
Clearance Time (s)	3.7	5.3	5.3	3.7	5.3		3.7	5.3	5.3	3.7	5.3	5.3
Vehicle Extension (s)	3.0	3.5	3.5	3.0	3.5		3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	421	864	387	533	957		289	1345	602	140	1049	445
v/s Ratio Prot	0.10	c0.20		c0.15	c0.17		c0.15	0.28		0.07	0.19	
v/s Ratio Perm			0.08						c0.29			0.05
v/c Ratio	0.79	0.84	0.32	0.93	0.60		0.90	0.73	0.77	0.83	0.66	0.16
Uniform Delay, d1	48.3	40.7	35.2	47.3	35.6		46.6	30.2	30.9	51.4	34.9	30.4
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	9.5	7.3	0.6	23.7	1.1		29.2	3.5	9.4	31.4	3.2	0.8
Delay (s)	57.8	48.0	35.7	71.0	36.7		75.8	33.7	40.3	82.9	38.1	31.2
Level of Service	E	D	D	E	D		E	C	D	F	D	C
Approach Delay (s)		48.4			52.4			41.7			41.3	
Approach LOS		D			D			D			D	

Intersection Summary

HCM Average Control Delay	45.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	113.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	83.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	568	322	0	0	396	158	1	5	7	161	1	432
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	617	350	0	0	430	172	1	5	8	175	1	470
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												4
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	602			350			2016	2187	350	2111	2101	516
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	602			350			2016	2187	350	2111	2101	516
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 %	36			100			67	67	99	0	94	16
cM capacity (veh/h)	970			1209			3	17	693	14	19	559

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	617	350	0	602	14	646
Volume Left	617	0	0	0	1	175
Volume Right	0	0	0	172	8	470
cSH	970	1700	1700	1700	21	48
Volume to Capacity	0.64	0.21	0.00	0.35	0.67	13.49
Queue Length 95th (ft)	118	0	0	0	48	Err
Control Delay (s)	15.0	0.0	0.0	0.0	340.5	Err
Lane LOS	B				F	F
Approach Delay (s)	9.5		0.0		340.5	Err
Approach LOS					F	F

Intersection Summary			
Average Delay	2902.2		
Intersection Capacity Utilization	87.6%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	469	537	20	136	610	213	25	530	221	176	450	761
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3517		1770	3539	1562	1770	3369		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	3517		1770	3539	1562	1770	3369		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	510	584	22	148	663	232	27	576	240	191	489	827
RTOR Reduction (vph)	0	0	0	0	0	177	0	0	0	0	0	249
Lane Group Flow (vph)	510	606	0	148	663	55	27	816	0	191	489	578
Confl. Peds. (#/hr)			1	2		1	1		2	1		
Turn Type	Prot			Prot		Perm	Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6						4
Actuated Green, G (s)	14.2	24.1		9.9	19.3	19.3	1.8	23.1		12.7	34.5	34.5
Effective Green, g (s)	14.7	26.6		9.4	21.3	21.3	1.3	25.6		12.2	36.5	36.5
Actuated g/C Ratio	0.16	0.30		0.10	0.24	0.24	0.01	0.29		0.14	0.41	0.41
Clearance Time (s)	4.5	6.5		3.5	6.0	6.0	3.5	6.5		3.5	6.0	6.0
Vehicle Extension (s)	1.0	4.5		1.0	4.5	4.5	1.0	4.5		1.0	4.5	4.5
Lane Grp Cap (vph)	562	1042		185	839	370	26	960		240	757	643
v/s Ratio Prot	c0.15	0.17		0.08	c0.19		0.02	c0.24		0.11	0.26	
v/s Ratio Perm						0.04						c0.36
v/c Ratio	0.91	0.58		0.80	0.79	0.15	1.04	0.85		0.80	0.65	0.90
Uniform Delay, d1	36.9	26.9		39.3	32.2	27.1	44.2	30.3		37.6	21.4	24.9
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	18.0	2.4		20.3	7.5	0.8	188.7	7.7		15.5	2.3	15.9
Delay (s)	54.9	29.2		59.6	39.6	27.9	233.0	38.0		53.1	23.8	40.9
Level of Service	D	C		E	D	C	F	D		D	C	D
Approach Delay (s)		41.0			39.9			44.2			36.9	
Approach LOS		D			D			D			D	

Intersection Summary

HCM Average Control Delay	40.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	89.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	422	15	1	786	12	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	459	16	1	854	13	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			475		896	238
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			475		896	238
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		95	100
cM capacity (veh/h)			1083		279	764

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	306	169	286	570	14
Volume Left	0	0	1	0	13
Volume Right	0	16	0	0	1
cSH	1700	1700	1083	1700	294
Volume to Capacity	0.18	0.10	0.00	0.34	0.05
Queue Length 95th (ft)	0	0	0	0	4
Control Delay (s)	0.0	0.0	0.0	0.0	17.9
Lane LOS			A		C
Approach Delay (s)	0.0		0.0		17.9
Approach LOS					C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	727	48	43	1468	71	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1600	1583	1770	1600	1770	1583
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1600	1583	1770	1600	1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	790	52	47	1596	77	90
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	790	52	47	1596	77	90
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	86.9	86.9	6.7	97.3	10.8	10.8
Effective Green, g (s)	88.9	88.9	6.4	99.3	11.0	11.0
Actuated g/C Ratio	0.75	0.75	0.05	0.84	0.09	0.09
Clearance Time (s)	6.0	6.0	3.7	6.0	4.2	4.2
Vehicle Extension (s)	1.5	1.5	3.0	1.5	2.0	2.0
Lane Grp Cap (vph)	1202	1190	96	1343	165	147
v/s Ratio Prot	0.49		0.03	c1.00	0.04	
v/s Ratio Perm		0.03				c0.06
v/c Ratio	0.66	0.04	0.49	1.19	0.47	0.61
Uniform Delay, d1	7.2	3.8	54.4	9.5	50.9	51.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	0.0	3.9	92.5	0.8	5.2
Delay (s)	8.2	3.8	58.3	102.0	51.6	56.8
Level of Service	A	A	E	F	D	E
Approach Delay (s)	7.9			100.8	54.4	
Approach LOS	A			F	D	

Intersection Summary

HCM Average Control Delay	68.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	118.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	705	19	54	1260	170	32	33	138	251	42	219
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0		4.0			4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.91			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.96	1.00
Satd. Flow (prot)	1770	1600	1583	1770	1600	1583		1679			1786	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.89			0.54	1.00
Satd. Flow (perm)	1770	1863	1583	1770	1863	1583		1498			1000	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	766	21	59	1370	185	35	36	150	273	46	238
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	92	766	21	59	1370	185	0	221	0	0	319	238
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	4.5	40.0	40.0	3.2	38.7	38.7		24.0			24.0	24.0
Effective Green, g (s)	4.0	42.0	42.0	2.7	40.7	40.7		24.0			24.0	24.0
Actuated g/C Ratio	0.05	0.52	0.52	0.03	0.50	0.50		0.30			0.30	0.30
Clearance Time (s)	3.5	6.0	6.0	3.5	6.0	6.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	88	833	824	59	807	798		446			297	471
v/s Ratio Prot	c0.05	0.48		0.03	c0.86							
v/s Ratio Perm			0.01			0.12		0.15			c0.32	0.15
v/c Ratio	1.05	0.92	0.03	1.00	1.70	0.23		0.50			1.07	0.51
Uniform Delay, d1	38.4	17.8	9.4	39.0	20.0	11.2		23.4			28.4	23.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	108.9	16.9	0.1	117.2	319.3	0.7		0.9			73.3	0.9
Delay (s)	147.2	34.7	9.5	156.2	339.3	11.9		24.2			101.6	24.3
Level of Service	F	C	A	F	F	B		C			F	C
Approach Delay (s)		45.8			295.1			24.2			68.6	
Approach LOS		D			F			C			E	

Intersection Summary

HCM Average Control Delay	171.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.44		
Actuated Cycle Length (s)	80.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	108.7%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	205	877	13	29	1303	635	17	25	40	331	17	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	1.00	0.99		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3200		1770	3200	1559	1656	1673		3433	1863	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3200		1770	3200	1559	1656	1673		3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	223	953	14	32	1416	690	18	27	43	360	18	182
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	223	967	0	32	1416	690	18	70	0	360	18	182
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	9%	2%	2%	2%	2%	2%
Turn Type	Prot			Prot		pm+ov	Split			Split		Perm
Protected Phases	5	2		1	6	7	8	8		7	7	
Permitted Phases						6						7
Actuated Green, G (s)	8.8	42.9		2.2	36.3	50.6	4.0	4.0		14.3	14.3	14.3
Effective Green, g (s)	9.0	44.9		2.4	38.3	53.2	4.2	4.2		15.6	15.6	15.6
Actuated g/C Ratio	0.11	0.54		0.03	0.46	0.64	0.05	0.05		0.19	0.19	0.19
Clearance Time (s)	4.2	6.0		4.2	6.0	5.3	4.2	4.2		5.3	5.3	5.3
Vehicle Extension (s)	2.5	2.5		3.0	2.5	2.5	2.0	2.0		2.5	2.5	2.5
Lane Grp Cap (vph)	192	1729		51	1475	998	84	85		644	350	297
v/s Ratio Prot	c0.13	0.30		0.02	c0.44	c0.13	0.01	c0.04		0.10	0.01	
v/s Ratio Perm						0.31						0.11
v/c Ratio	1.16	0.56		0.63	0.96	0.69	0.21	0.82		0.56	0.05	0.61
Uniform Delay, d1	37.0	12.6		39.9	21.7	9.7	37.9	39.1		30.6	27.7	31.0
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	115.2	0.3		21.7	14.8	1.9	0.5	43.2		0.8	0.0	3.2
Delay (s)	152.2	12.9		61.6	36.5	11.6	38.3	82.3		31.5	27.7	34.2
Level of Service	F	B		E	D	B	D	F		C	C	C
Approach Delay (s)		39.0			28.8			73.3			32.2	
Approach LOS		D			C			E			C	

Intersection Summary

HCM Average Control Delay	33.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	83.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	184	1064	1390	17	0	577
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0			4.0
Lane Util. Factor	1.00	0.95	0.95			0.88
Frt	1.00	1.00	1.00			0.85
Flt Protected	0.95	1.00	1.00			1.00
Satd. Flow (prot)	1770	3200	3200			2787
Flt Permitted	0.95	1.00	1.00			1.00
Satd. Flow (perm)	1770	3200	3200			2787
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	200	1157	1511	18	0	627
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	200	1157	1529	0	0	627
Turn Type	Prot					Over
Protected Phases	5	2	6			5
Permitted Phases						
Actuated Green, G (s)	22.4	78.4	45.4			22.4
Effective Green, g (s)	23.0	78.4	47.4			23.0
Actuated g/C Ratio	0.29	1.00	0.60			0.29
Clearance Time (s)	4.6	2.0	6.0			4.6
Vehicle Extension (s)	3.0	3.0	3.0			3.0
Lane Grp Cap (vph)	519	3200	1935			818
v/s Ratio Prot	0.11	0.36	c0.48			c0.23
v/s Ratio Perm						
v/c Ratio	0.39	0.36	0.79			0.77
Uniform Delay, d1	22.1	0.0	11.7			25.3
Progression Factor	1.00	1.00	1.00			1.00
Incremental Delay, d2	0.5	0.1	2.3			4.3
Delay (s)	22.5	0.1	14.0			29.6
Level of Service	C	A	B			C
Approach Delay (s)		3.4	14.0		29.6	
Approach LOS		A	B		C	

Intersection Summary

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

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	109	945	10	7	1214	118	5	1	3	373	3	188
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		0.97	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.89		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1600	1583	1770	1600	1583	1770	1653		3433	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	1600	1583	1770	1600	1583	1770	1653		3433	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	118	1027	11	8	1320	128	5	1	3	405	3	204
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	118	1027	11	8	1320	128	5	4	0	405	3	204
Turn Type	Prot		Perm	Prot		Perm	Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6						4
Actuated Green, G (s)	7.8	105.7	105.7	0.8	98.5	98.5	0.8	3.3		20.0	22.1	22.1
Effective Green, g (s)	8.0	107.7	107.7	0.8	100.5	100.5	1.0	3.3		20.0	22.3	22.3
Actuated g/C Ratio	0.05	0.73	0.73	0.01	0.68	0.68	0.01	0.02		0.14	0.15	0.15
Clearance Time (s)	4.2	6.0	6.0	4.0	6.0	6.0	4.2	4.0		4.0	4.2	4.2
Vehicle Extension (s)	4.5	4.5	4.5	3.0	4.5	4.5	4.5	3.0		3.0	3.5	3.5
Lane Grp Cap (vph)	96	1166	1154	10	1088	1076	12	37		465	281	239
v/s Ratio Prot	c0.07	0.64		0.00	c0.82		0.00	0.00		c0.12	0.00	
v/s Ratio Perm			0.01			0.08						c0.13
v/c Ratio	1.23	0.88	0.01	0.80	1.21	0.12	0.42	0.11		0.87	0.01	0.85
Uniform Delay, d1	69.9	15.2	5.5	73.4	23.7	8.2	73.1	70.8		62.6	53.4	61.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	165.7	8.4	0.0	169.7	104.6	0.1	35.8	1.3		16.2	0.0	24.9
Delay (s)	235.6	23.6	5.5	243.1	128.2	8.3	108.9	72.1		78.8	53.4	86.0
Level of Service	F	C	A	F	F	A	F	E		E	D	F
Approach Delay (s)		45.1			118.3			92.6			81.1	
Approach LOS		D			F			F			F	

Intersection Summary

HCM Average Control Delay	85.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.14		
Actuated Cycle Length (s)	147.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	97.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	1197	64	13	1196	31	70	5	30	41	4	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0			4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.96	1.00
Satd. Flow (prot)	1770	1600	1583	1770	1600	1583	1770	1620			1781	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.73	1.00			0.72	1.00
Satd. Flow (perm)	1770	1600	1583	1770	1600	1583	1351	1620			1333	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	1301	70	14	1300	34	76	5	33	45	4	78
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	65	1301	70	14	1300	34	76	38	0	0	49	78
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	5.3	112.0	112.0	1.6	108.3	108.3	13.1	13.1			13.1	13.1
Effective Green, g (s)	5.0	114.0	114.0	1.3	110.3	110.3	13.2	13.2			13.2	13.2
Actuated g/C Ratio	0.04	0.81	0.81	0.01	0.79	0.79	0.09	0.09			0.09	0.09
Clearance Time (s)	3.7	6.0	6.0	3.7	6.0	6.0	4.1	4.1			4.1	4.1
Vehicle Extension (s)	3.0	4.0	4.0	3.0	4.0	4.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)	63	1298	1284	16	1256	1243	127	152			125	149
v/s Ratio Prot	c0.04	c0.81		0.01	c0.81			0.02				
v/s Ratio Perm			0.04			0.02	c0.06				0.04	0.05
v/c Ratio	1.03	1.00	0.05	0.88	1.04	0.03	0.60	0.25			0.39	0.52
Uniform Delay, d1	67.8	13.2	2.6	69.5	15.1	3.3	61.1	59.1			59.9	60.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00
Incremental Delay, d2	122.5	25.5	0.0	161.3	34.9	0.0	7.4	0.9			2.0	3.3
Delay (s)	190.3	38.8	2.6	230.8	50.0	3.3	68.5	59.9			61.9	63.9
Level of Service	F	D	A	F	D	A	E	E			E	E
Approach Delay (s)		43.9			50.7			65.6			63.2	
Approach LOS		D			D			E			E	

Intersection Summary

HCM Average Control Delay	48.5	HCM Level of Service	D
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	140.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1127	140	211	1023	217	386
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	0.97	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1600	1583	3433	1600	1770	1546
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1600	1583	3433	1600	1770	1546
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1225	152	229	1112	236	420
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	1225	152	229	1112	236	420
Confl. Peds. (#/hr)			1		1	1
Heavy Vehicles (%)	2%	2%	2%	4%	2%	2%
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	86.0	86.0	8.3	98.0	32.3	32.3
Effective Green, g (s)	88.0	88.0	8.0	100.0	32.0	32.0
Actuated g/C Ratio	0.63	0.63	0.06	0.71	0.23	0.23
Clearance Time (s)	6.0	6.0	3.7	6.0	3.7	3.7
Vehicle Extension (s)	2.5	2.5	2.5	2.5	3.0	3.0
Lane Grp Cap (vph)	1006	995	196	1143	405	353
v/s Ratio Prot	c0.77		c0.07	0.69	0.13	
v/s Ratio Perm		0.10				c0.27
v/c Ratio	1.22	0.15	1.17	0.97	0.58	1.19
Uniform Delay, d1	26.0	10.7	66.0	18.7	48.1	54.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	107.1	0.1	117.0	20.2	2.1	110.2
Delay (s)	133.1	10.7	183.0	39.0	50.2	164.2
Level of Service	F	B	F	D	D	F
Approach Delay (s)	119.6			63.6	123.2	
Approach LOS	F			E	F	

Intersection Summary

HCM Average Control Delay	98.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.21		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	1392	121	157	1152	7	82	1	161	4	1	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.96	1.00
Satd. Flow (prot)	1770	1600	1583	3433	1600			1775	1568		1791	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.96	1.00
Satd. Flow (perm)	1770	1600	1583	3433	1600			1775	1568		1791	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1	1513	132	171	1252	8	89	1	175	4	1	4
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	1	1513	132	171	1260	0	0	90	175	0	5	4
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	3%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Split		Perm	Split		Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	0.8	92.5	92.5	11.7	103.1			25.4	25.4		2.7	2.7
Effective Green, g (s)	0.8	94.5	94.5	11.4	105.1			25.4	25.4		2.7	2.7
Actuated g/C Ratio	0.01	0.63	0.63	0.08	0.70			0.17	0.17		0.02	0.02
Clearance Time (s)	4.0	6.0	6.0	3.7	6.0			4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	2.5	3.0			3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	9	1008	997	261	1121			301	266		32	28
v/s Ratio Prot	0.00	c0.95		c0.05	c0.79			0.05			c0.00	
v/s Ratio Perm			0.08						c0.11			0.00
v/c Ratio	0.11	1.50	0.13	0.66	1.12			0.30	0.66		0.16	0.14
Uniform Delay, d1	74.2	27.8	11.2	67.4	22.5			54.5	58.2		72.5	72.5
Progression Factor	1.00	1.00	1.00	1.04	0.71			1.00	1.00		1.00	1.00
Incremental Delay, d2	5.4	230.7	0.3	0.5	57.1			0.6	5.8		2.3	2.3
Delay (s)	79.7	258.4	11.5	70.5	73.1			55.1	64.0		74.8	74.9
Level of Service	E	F	B	E	E			E	E		E	E
Approach Delay (s)		238.5			72.8			61.0			74.8	
Approach LOS		F			E			E			E	

Intersection Summary

HCM Average Control Delay	153.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.30		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	96.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	1453	112	151	1235	1	72	2	111	1	1	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0			4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00			1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	0.97		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.98	1.00
Satd. Flow (prot)	1770	1600	1583	3273	1600			1776	1539		1817	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00			0.95	1.00		0.98	1.00
Satd. Flow (perm)	1770	1600	1583	3273	1600			1776	1539		1817	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	2	1579	122	164	1342	1	78	2	121	1	1	2
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	2	1579	122	164	1343	0	0	80	121	0	2	2
Confl. Peds. (#/hr)				1		1			1	1		
Heavy Vehicles (%)	2%	2%	2%	7%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Prot		Perm	Prot			Split		Perm	Split		Perm
Protected Phases	5	2		1	6		3	3		4	4	
Permitted Phases			2						3			4
Actuated Green, G (s)	1.3	101.2	101.2	17.1	117.0			9.3	9.3		5.3	5.3
Effective Green, g (s)	1.0	103.2	103.2	16.8	119.0			9.0	9.0		5.0	5.0
Actuated g/C Ratio	0.01	0.69	0.69	0.11	0.79			0.06	0.06		0.03	0.03
Clearance Time (s)	3.7	6.0	6.0	3.7	6.0			3.7	3.7		3.7	3.7
Vehicle Extension (s)	3.0	3.0	3.0	2.5	3.0			2.5	2.5		2.5	2.5
Lane Grp Cap (vph)	12	1101	1089	367	1269			107	92		61	53
v/s Ratio Prot	0.00	c0.99		c0.05	c0.84			0.05			0.00	
v/s Ratio Perm			0.08						c0.08			c0.00
v/c Ratio	0.17	1.43	0.11	0.45	1.06			0.75	1.32		0.03	0.04
Uniform Delay, d1	74.1	23.4	7.9	62.3	15.5			69.4	70.5		70.2	70.2
Progression Factor	1.13	1.47	0.95	1.00	1.00			1.00	1.00		1.00	1.00
Incremental Delay, d2	0.6	195.9	0.0	0.6	42.2			23.3	199.8		0.2	0.2
Delay (s)	84.3	230.2	7.5	62.9	57.7			92.7	270.3		70.3	70.4
Level of Service	F	F	A	E	E			F	F		E	E
Approach Delay (s)		214.1			58.3			199.6			70.4	
Approach LOS		F			E			F			E	

Intersection Summary

HCM Average Control Delay	144.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	97.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	0	0	0	0	0	1	164	0	1	225	37
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.71	0.92	0.71	0.92	0.92	0.92	0.80	0.80	0.92	0.92	0.87	0.87
Hourly flow rate (vph)	28	0	0	0	0	0	1	205	0	1	259	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	490	490	280	490	511	205	301			205		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	490	490	280	490	511	205	301			205		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	100	100	100	100	100	100			100		
cM capacity (veh/h)	488	478	759	488	465	836	1260			1366		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	28	0	206	302
Volume Left	28	0	1	1
Volume Right	0	0	0	43
cSH	488	1700	1260	1366
Volume to Capacity	0.06	0.00	0.00	0.00
Queue Length 95th (ft)	5	0	0	0
Control Delay (s)	12.8	0.0	0.1	0.0
Lane LOS	B	A	A	A
Approach Delay (s)	12.8	0.0	0.1	0.0
Approach LOS	B	A		

Intersection Summary			
Average Delay	0.7		
Intersection Capacity Utilization	24.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	61	1503	1344	42	2	43
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	66	1634	1461	46	2	47
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1507				3227	1461
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1507				3227	1461
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	85				76	70
cM capacity (veh/h)	444				9	158

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	66	1634	1461	46	2	47
Volume Left	66	0	0	0	2	0
Volume Right	0	0	0	46	0	47
cSH	444	1700	1700	1700	9	158
Volume to Capacity	0.15	0.96	0.86	0.03	0.24	0.30
Queue Length 95th (ft)	13	0	0	0	14	29
Control Delay (s)	14.5	0.0	0.0	0.0	498.6	37.0
Lane LOS	B				F	E
Approach Delay (s)	0.6		0.0		57.5	
Approach LOS					F	

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	89.1%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	32	8	30	2	14	11	68	32	2	48	100	104
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	9	33	3	20	15	119	56	4	55	115	120

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	78	38	119	60	55	234
Volume Left (vph)	36	3	119	0	55	0
Volume Right (vph)	33	15	0	4	0	120
Hadj (s)	-0.13	-0.20	0.53	-0.01	0.53	-0.32
Departure Headway (s)	4.9	4.9	5.6	5.0	5.5	4.7
Degree Utilization, x	0.11	0.05	0.19	0.08	0.08	0.30
Capacity (veh/h)	672	665	623	686	631	751
Control Delay (s)	8.5	8.2	8.7	7.3	7.8	8.5
Approach Delay (s)	8.5	8.2	8.2		8.3	
Approach LOS	A	A	A		A	

Intersection Summary			
Delay	8.3		
HCM Level of Service	A		
Intersection Capacity Utilization	36.5%	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	9	22	178	29	121	21	100	22	27	29	19
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)	45	13	32	205	33	139	26	123	27	34	37	24

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	90	377	26	151	34	61
Volume Left (vph)	45	205	26	0	34	0
Volume Right (vph)	32	139	0	27	0	24
Hadj (s)	-0.06	-0.08	0.53	-0.09	0.53	-0.24
Departure Headway (s)	5.1	4.7	6.4	5.7	6.5	5.7
Degree Utilization, x	0.13	0.49	0.05	0.24	0.06	0.10
Capacity (veh/h)	647	734	527	583	507	574
Control Delay (s)	8.8	12.2	8.5	9.3	8.7	8.1
Approach Delay (s)	8.8	12.2	9.2		8.3	
Approach LOS	A	B	A		A	

Intersection Summary			
Delay	10.6		
HCM Level of Service	B		
Intersection Capacity Utilization	44.4%	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)	231	647	0	0	260	231	135	1	141	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0	4.0			
Lane Util. Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00	0.99			
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1752	1863			1863	1553		1771	1562			
Flt Permitted	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	1752	1863			1863	1553		1771	1562			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	251	703	0	0	283	251	147	1	153	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	251	703	0	0	283	251	0	148	153	0	0	0
Confl. Peds. (#/hr)			2				2		2			
Heavy Vehicles (%)	3%	2%	2%	2%	2%	4%	2%	2%	2%	2%	2%	2%
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	5	2			6			8				
Permitted Phases						6	8		8			
Actuated Green, G (s)	10.6	29.6			15.3	15.3		8.4	8.4			
Effective Green, g (s)	10.3	31.6			17.3	17.3		9.3	9.3			
Actuated g/C Ratio	0.21	0.65			0.35	0.35		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)	369	1204			659	549		337	297			
v/s Ratio Prot	c0.14	c0.38			0.15							
v/s Ratio Perm						0.16		0.08	c0.10			
v/c Ratio	0.68	0.58			0.43	0.46		0.44	0.52			
Uniform Delay, d1	17.8	4.9			12.0	12.2		17.5	17.8			
Progression Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2	5.1	2.1			0.5	0.6		0.9	1.5			
Delay (s)	22.9	7.0			12.5	12.8		18.4	19.3			
Level of Service	C	A			B	B		B	B			
Approach Delay (s)		11.2			12.6			18.9			0.0	
Approach LOS		B			B			B			A	

Intersection Summary

HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	48.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	86.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	497	161	111	284	0	0	0	0	381	0	273
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0	4.0						4.0	4.0
Lane Util. Factor		1.00		1.00	1.00						1.00	1.00
Frpb, ped/bikes		0.99		1.00	1.00						1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00						1.00	1.00
Frt		0.97		1.00	1.00						1.00	0.85
Flt Protected		1.00		0.95	1.00						0.95	1.00
Satd. Flow (prot)		1777		1770	1845						1770	1583
Flt Permitted		1.00		0.95	1.00						0.95	1.00
Satd. Flow (perm)		1777		1770	1845						1770	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	540	175	121	309	0	0	0	0	414	0	297
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	715	0	121	309	0	0	0	0	0	414	297
Confl. Peds. (#/hr)			2	2								
Heavy Vehicles (%)	2%	3%	2%	2%	3%	2%	2%	2%	2%	2%	2%	2%
Turn Type				Prot						Perm		Perm
Protected Phases		2		1	6						4	
Permitted Phases										4		4
Actuated Green, G (s)		30.0		6.3	40.0						19.1	19.1
Effective Green, g (s)		32.0		6.0	42.0						20.0	20.0
Actuated g/C Ratio		0.46		0.09	0.60						0.29	0.29
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)		812		152	1107						506	452
v/s Ratio Prot		c0.40		c0.07	0.17							
v/s Ratio Perm											0.23	0.19
v/c Ratio		0.88		0.80	0.28						0.82	0.66
Uniform Delay, d1		17.3		31.4	6.7						23.3	22.0
Progression Factor		1.00		1.00	1.00						1.00	1.00
Incremental Delay, d2		11.0		24.3	0.6						13.7	7.3
Delay (s)		28.2		55.7	7.4						37.0	29.3
Level of Service		C		E	A						D	C
Approach Delay (s)		28.2			21.0			0.0			33.8	
Approach LOS		C			C			A			C	

Intersection Summary

HCM Average Control Delay	28.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	86.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	3	5	431	6	0	0	0	0	93	1	3
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	3	5	468	7	0	0	0	0	101	1	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	7			9			953	949	6	949	952	7
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	7			9			953	949	6	949	952	7
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.6	4.0	3.3
p0 queue free %	100			71			100	100	100	44	99	100
cM capacity (veh/h)	1614			1605			183	184	1077	179	184	1076

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	9	475	105
Volume Left	0	468	101
Volume Right	5	0	3
cSH	1700	1605	184
Volume to Capacity	0.01	0.29	0.57
Queue Length 95th (ft)	0	31	77
Control Delay (s)	0.0	8.1	48.0
Lane LOS		A	E
Approach Delay (s)	0.0	8.1	48.0
Approach LOS			E

Intersection Summary			
Average Delay	15.1		
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	96	0	0	430	7	268
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	104	0	0	467	8	291
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			104		572	104
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			104		572	104
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			100		98	69
cM capacity (veh/h)			1487		482	934

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	104	467	8	291
Volume Left	0	0	8	0
Volume Right	0	0	0	291
cSH	1700	1700	482	934
Volume to Capacity	0.06	0.27	0.02	0.31
Queue Length 95th (ft)	0	0	1	33
Control Delay (s)	0.0	0.0	12.6	10.6
Lane LOS			B	B
Approach Delay (s)	0.0	0.0	10.6	
Approach LOS			B	

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	32.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SWL	SWR
Lane Configurations						
Volume (veh/h)	6	358	421	145	0	9
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	389	458	158	0	10
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						3
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	615				860	458
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	615				860	458
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)	964				324	603

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SW 1
Volume Total	7	389	458	158	10
Volume Left	7	0	0	0	0
Volume Right	0	0	0	158	10
cSH	964	1700	1700	1700	151
Volume to Capacity	0.01	0.23	0.27	0.09	0.06
Queue Length 95th (ft)	1	0	0	0	5
Control Delay (s)	8.8	0.0	0.0	0.0	30.5
Lane LOS	A				D
Approach Delay (s)	0.1		0.0		30.5
Approach LOS					D

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	32.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	482	542	186	686	727	127	234	863	506	95	934	374
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	5.3
Lane Util. Factor	0.97	0.95	1.00	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.99	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3433	3539	1558	3433	3452		1770	3539	1561	1770	3539	1559
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3433	3539	1558	3433	3452		1770	3539	1561	1770	3539	1559
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	524	589	202	746	790	138	254	938	550	103	1015	407
RTOR Reduction (vph)	0	0	97	0	11	0	0	0	311	0	0	241
Lane Group Flow (vph)	524	589	105	746	917	0	254	938	239	103	1015	166
Confl. Peds. (#/hr)	4		3	2		3	3		2	3		3
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			6
Actuated Green, G (s)	20.1	27.7	27.7	26.3	33.9		18.7	40.8	40.8	11.9	34.0	34.0
Effective Green, g (s)	19.8	29.0	29.0	26.0	35.2		18.4	42.1	42.1	11.6	35.3	34.0
Actuated g/C Ratio	0.16	0.23	0.23	0.21	0.28		0.15	0.34	0.34	0.09	0.28	0.27
Clearance Time (s)	3.7	5.3	5.3	3.7	5.3		3.7	5.3	5.3	3.7	5.3	5.3
Vehicle Extension (s)	3.0	3.5	3.5	3.0	3.5		3.0	4.0	4.0	3.0	4.0	4.0
Lane Grp Cap (vph)	545	823	362	716	974		261	1195	527	165	1002	425
v/s Ratio Prot	0.15	0.17		c0.22	c0.27		c0.14	0.27		0.06	c0.29	
v/s Ratio Perm			0.07						0.15			0.11
v/c Ratio	0.96	0.72	0.29	1.04	0.94		0.97	0.78	0.45	0.62	1.01	0.39
Uniform Delay, d1	52.1	44.1	39.4	49.4	43.7		52.9	37.2	32.3	54.5	44.7	36.9
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	28.9	3.1	0.5	45.0	16.6		47.9	5.2	2.8	7.2	31.7	2.7
Delay (s)	81.0	47.1	39.9	94.4	60.3		100.8	42.4	35.1	61.6	76.4	39.6
Level of Service	F	D	D	F	E		F	D	D	E	E	D
Approach Delay (s)		59.5			75.5			48.6			65.6	
Approach LOS		E			E			D			E	

Intersection Summary

HCM Average Control Delay	62.2	HCM Level of Service	E
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	124.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	90.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	716	506	1	6	511	124	0	1	1	166	1	795
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	778	550	1	7	555	135	0	1	1	180	1	864
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												4
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	690			551			2676	2810	551	2744	2743	623
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	690			551			2676	2810	551	2744	2743	623
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 %	14			99			0	57	100	0	61	0
cM capacity (veh/h)	904			1019			0	3	534	2	3	486

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	778	551	7	690	2	1046
Volume Left	778	0	7	0	0	180
Volume Right	0	1	0	135	1	864
cSH	904	1700	1019	1700	5	14
Volume to Capacity	0.86	0.32	0.01	0.41	0.44	74.85
Queue Length 95th (ft)	273	0	0	0	19	Err
Control Delay (s)	27.9	0.0	8.6	0.0	996.0	Err
Lane LOS	D		A		F	F
Approach Delay (s)	16.3		0.1		996.0	Err
Approach LOS					F	F

Intersection Summary			
Average Delay	3409.1		
Intersection Capacity Utilization	100.0%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	739	602	17	306	653	359	34	715	282	204	706	480
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	0.97	0.95		1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	3433	3525		1770	3539	1583	1770	3389		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	3525		1770	3539	1583	1770	3389		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	803	654	18	333	710	390	37	777	307	222	767	522
RTOR Reduction (vph)	0	0	0	0	0	182	0	0	0	0	0	93
Lane Group Flow (vph)	803	672	0	333	710	208	37	1084	0	222	767	429
Turn Type	Prot			Prot		Perm	Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases						6						4
Actuated Green, G (s)	32.3	34.3		25.9	27.4	27.4	3.0	30.5		17.5	45.5	45.5
Effective Green, g (s)	32.8	36.8		25.4	29.4	29.4	2.5	33.0		17.0	47.5	47.5
Actuated g/C Ratio	0.26	0.29		0.20	0.23	0.23	0.02	0.26		0.13	0.37	0.37
Clearance Time (s)	4.5	6.5		3.5	6.0	6.0	3.5	6.5		3.5	6.0	6.0
Vehicle Extension (s)	1.0	4.5		1.0	4.5	4.5	1.0	4.5		1.0	4.5	4.5
Lane Grp Cap (vph)	878	1012		351	812	363	35	872		235	690	587
v/s Ratio Prot	c0.23	0.19		0.19	c0.20		0.02	c0.32		0.13	c0.41	
v/s Ratio Perm						0.13						0.27
v/c Ratio	0.91	0.66		0.95	0.87	0.57	1.06	1.24		0.94	1.11	0.73
Uniform Delay, d1	46.3	40.3		50.8	47.6	43.8	62.8	47.6		55.1	40.3	34.8
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	13.6	3.4		34.1	12.6	6.4	169.8	119.1		42.9	69.1	5.3
Delay (s)	59.9	43.7		84.9	60.2	50.3	232.6	166.7		98.0	109.5	40.1
Level of Service	E	D		F	E	D	F	F		F	F	D
Approach Delay (s)		52.5			63.3			168.9			83.8	
Approach LOS		D			E			F			F	

Intersection Summary

HCM Average Control Delay	87.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	128.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	93.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	765	23	1	468	23	1
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	832	25	1	509	25	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			857		1101	428
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			857		1101	428
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		88	100
cM capacity (veh/h)			780		206	575

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	554	302	171	339	26
Volume Left	0	0	1	0	25
Volume Right	0	25	0	0	1
cSH	1700	1700	780	1700	212
Volume to Capacity	0.33	0.18	0.00	0.20	0.12
Queue Length 95th (ft)	0	0	0	0	10
Control Delay (s)	0.0	0.0	0.1	0.0	24.4
Lane LOS			A		C
Approach Delay (s)	0.0		0.0		24.4
Approach LOS					C

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	31.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCS+: Two-Lane Highways Release 5.2

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Two-Way Two-Lane Highway Segment Analysis

Analyst	LM
Agency/Co.	HMM
Date Performed	10/15/2008
Analysis Time Period	Back+ Alternative Project AM
Highway	68
From/To	San Benancio Rd. / Torero Dr.
Jurisdiction	
Analysis Year	
Description 252572	

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 2629 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	2869	pc/h
Highest directional split proportion (note-2)	1549	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	35.9	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	2858	pc/h
Highest directional split proportion (note-2)	1543	
Base percent time-spent-following, BPTSF	91.9	%
Adj.for directional distribution and no-passing zones, fd/np	2.1	
Percent time-spent-following, PTSF	94.0	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.90	
Peak 15-min vehicle-miles of travel, VMT15	1000	veh-mi
Peak-hour vehicle-miles of travel, VMT60	3681	veh-mi
Peak 15-min total travel time, TT15	27.9	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

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Two-Way Two-Lane Highway Segment Analysis

Analyst	LM
Agency/Co.	HMM
Date Performed	10/15/2008
Analysis Time Period	Back+Alternative Project AM
Highway	68
From/To	Torero Dr. / Begin-End Freeway
Jurisdiction	
Analysis Year	
Description 252572	

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 2260 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	2466	pc/h
Highest directional split proportion (note-2)	1307	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.3	mi/h
Free-flow speed, FFS	59.8	mi/h
Adjustment for no-passing zones, fnp	1.1	mi/h
Average travel speed, ATS	39.5	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	2457	pc/h
Highest directional split proportion (note-2)	1302	
Base percent time-spent-following, BPTSF	88.5	%
Adj.for directional distribution and no-passing zones, fd/np	2.8	
Percent time-spent-following, PTSF	91.3	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.77	
Peak 15-min vehicle-miles of travel, VMT15	368	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1356	veh-mi
Peak 15-min total travel time, TT15	9.3	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

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Two-Way Two-Lane Highway Segment Analysis

Analyst	LM
Agency/Co.	HMM
Date Performed	10/15/2008
Analysis Time Period	Back + Alternative Project AM
Highway	218
From/To	Highway 68 / General Jim Moore
Jurisdiction	
Analysis Year	
Description 252572	

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 1308 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,	0.998	
Two-way flow rate,(note-1) vp	1425	pc/h
Highest directional split proportion (note-2)	770	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.3	mi/h
Free-flow speed, FFS	57.8	mi/h
Adjustment for no-passing zones, fnp	1.7	mi/h
Average travel speed, ATS	45.0	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1422	pc/h
Highest directional split proportion (note-2)	768	
Base percent time-spent-following, BPTSF	71.3	%
Adj.for directional distribution and no-passing zones, fd/np	7.8	
Percent time-spent-following, PTSF	79.2	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.45	
Peak 15-min vehicle-miles of travel, VMT15	249	veh-mi
Peak-hour vehicle-miles of travel, VMT60	916	veh-mi
Peak 15-min total travel time, TT15	5.5	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.

HCS+: Two-Lane Highways Release 5.2

Phone: Fax:
E-Mail:

Two-Way Two-Lane Highway Segment Analysis

Analyst	LM
Agency/Co.	HMM
Date Performed	10/15/2008
Analysis Time Period	Back + Alternative Project AM
Highway	Reservation Road
From/To	Davis Road / Highway 68
Jurisdiction	
Analysis Year	
Description 252572	

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 1052 veh/h
Directional split 51 / 49 %

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	1157	pc/h
Highest directional split proportion (note-2)	590	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	2.2	mi/h
Average travel speed, ATS	47.1	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	1150	pc/h
Highest directional split proportion (note-2)	587	
Base percent time-spent-following, BPTSF	63.6	%
Adj.for directional distribution and no-passing zones, fd/np	11.0	
Percent time-spent-following, PTSF	74.6	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.36	
Peak 15-min vehicle-miles of travel, VMT15	515	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1894	veh-mi
Peak 15-min total travel time, TT15	10.9	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	LM
Agency/Co.	HMM
Date Performed	10/15/2008
Analysis Time Period	Back + Alternative Project AM
Highway	Davis Road
From/To	Reservation Road / Blanco Road
Jurisdiction	
Analysis Year	
Description 252572	

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 1382 veh/h
Directional split 53 / 47 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.997	
Two-way flow rate,(note-1) vp	1507	pc/h
Highest directional split proportion (note-2)	799	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.8	mi/h
Free-flow speed, FFS	59.3	mi/h
Adjustment for no-passing zones, fnp	1.6	mi/h
Average travel speed, ATS	46.0	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1502	pc/h
Highest directional split proportion (note-2)	796	
Base percent time-spent-following, BPTSF	73.3	%
Adj.for directional distribution and no-passing zones, fd/np	7.3	
Percent time-spent-following, PTSF	80.6	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.47	
Peak 15-min vehicle-miles of travel, VMT15	789	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2902	veh-mi
Peak 15-min total travel time, TT15	17.2	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	LM
Agency/Co.	HMM
Date Performed	10/15/2008
Analysis Time Period	Back+Alternative Project PM
Highway	68
From/To	San Benancio Rd. / Torero Dr.
Jurisdiction	
Analysis Year	
Description 252572	

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 2952 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	3222	pc/h
Highest directional split proportion (note-2)	1708	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		mi/h
Average travel speed, ATS		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	3209	pc/h
Highest directional split proportion (note-2)	1701	
Base percent time-spent-following, BPTSF	94.0	%
Adj.for directional distribution and no-passing zones, fd/np	1.6	
Percent time-spent-following, PTSF	95.7	%

Level of Service and Other Performance Measures

Level of service, LOS		
Volume to capacity ratio, v/c	1.01	
Peak 15-min vehicle-miles of travel, VMT15	1123	veh-mi
Peak-hour vehicle-miles of travel, VMT60	4133	veh-mi
Peak 15-min total travel time, TT15		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	LM
Agency/Co.	HMM
Date Performed	10/15/2008
Analysis Time Period	Back+Alternative Project PM
Highway	68
From/To	Torero Dr. / Begin-End Freeway
Jurisdiction	
Analysis Year	
Description 252572	

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 2891 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	3155	pc/h
Highest directional split proportion (note-2)	1641	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	0.7	mi/h
Average travel speed, ATS	34.5	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	3142	pc/h
Highest directional split proportion (note-2)	1634	
Base percent time-spent-following, BPTSF	93.7	%
Adj.for directional distribution and no-passing zones, fd/np	1.6	
Percent time-spent-following, PTSF	95.3	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.99	
Peak 15-min vehicle-miles of travel, VMT15	471	veh-mi
Peak-hour vehicle-miles of travel, VMT60	1735	veh-mi
Peak 15-min total travel time, TT15	13.6	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.

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Two-Way Two-Lane Highway Segment Analysis

Analyst	LM
Agency/Co.	HMM
Date Performed	10/15/2008
Analysis Time Period	Back + Alternative Project PM
Highway	218
From/To	Highway 68 / General Jim Moore
Jurisdiction	
Analysis Year	
Description 252572	

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 1380 veh/h
Directional split 63 / 37 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.998	
Two-way flow rate,(note-1) vp	1503	pc/h
Highest directional split proportion (note-2)	947	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	2.3	mi/h
Free-flow speed, FFS	57.8	mi/h
Adjustment for no-passing zones, fnp	1.6	mi/h
Average travel speed, ATS	44.5	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	1500	pc/h
Highest directional split proportion (note-2)	945	
Base percent time-spent-following, BPTSF	73.2	%
Adj.for directional distribution and no-passing zones, fd/np	7.5	
Percent time-spent-following, PTSF	80.8	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.47	
Peak 15-min vehicle-miles of travel, VMT15	262	veh-mi
Peak-hour vehicle-miles of travel, VMT60	966	veh-mi
Peak 15-min total travel time, TT15	5.9	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	LM
Agency/Co.	HMM
Date Performed	10/15/2008
Analysis Time Period	Back + Alternative Project PM
Highway	Reservation Road
From/To	Davis Road / Highway 68
Jurisdiction	
Analysis Year	
Description 252572	

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 1314 veh/h
Directional split 51 / 49 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.994	
Two-way flow rate,(note-1) vp	1437	pc/h
Highest directional split proportion (note-2)	733	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	1.8	mi/h
Free-flow speed, FFS	58.3	mi/h
Adjustment for no-passing zones, fnp	1.7	mi/h
Average travel speed, ATS	45.4	mi/h

Percent Time-Spent-Following

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.0	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor, fHV	1.000	
Two-way flow rate,(note-1) vp	1428	pc/h
Highest directional split proportion (note-2)	728	
Base percent time-spent-following, BPTSF	71.5	%
Adj.for directional distribution and no-passing zones, fd/np	7.8	
Percent time-spent-following, PTSF	79.3	%

Level of Service and Other Performance Measures

Level of service, LOS	D	
Volume to capacity ratio, v/c	0.45	
Peak 15-min vehicle-miles of travel, VMT15	643	veh-mi
Peak-hour vehicle-miles of travel, VMT60	2365	veh-mi
Peak 15-min total travel time, TT15	14.2	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	LM
Agency/Co.	HMM
Date Performed	10/15/2008
Analysis Time Period	Back + Alternative Project PM
Highway	Davis Road
From/To	Reservation Road / Blanco Road
Jurisdiction	
Analysis Year	
Description 252572	

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 2060 veh/h
Directional split 56 / 44 %

Average Travel Speed

Grade adjustment factor, fG	1.00	
PCE for trucks, ET	1.1	
PCE for RVs, ER	1.0	
Heavy-vehicle adjustment factor,	0.997	
Two-way flow rate,(note-1) vp	2246	pc/h
Highest directional split proportion (note-2)	1258	pc/h
Free-Flow Speed from Field Measurement:		
Field measured speed, SFM	-	mi/h
Observed volume, Vf	-	veh/h
Estimated Free-Flow Speed:		
Base free-flow speed, BFFS	60.0	mi/h
Adj. for lane and shoulder width, fLS	0.0	mi/h
Adj. for access points, fA	0.8	mi/h
Free-flow speed, FFS	59.3	mi/h
Adjustment for no-passing zones, fnp	1.1	mi/h
Average travel speed, ATS	40.7	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	2239	pc/h
Highest directional split proportion (note-2)	1254	
Base percent time-spent-following, BPTSF	86.0	%
Adj.for directional distribution and no-passing zones, fd/np	3.5	
Percent time-spent-following, PTSF	89.5	%

Level of Service and Other Performance Measures

Level of service, LOS	E	
Volume to capacity ratio, v/c	0.70	
Peak 15-min vehicle-miles of travel, VMT15	1176	veh-mi
Peak-hour vehicle-miles of travel, VMT60	4326	veh-mi
Peak 15-min total travel time, TT15	28.9	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.