

2030 Future Conditions - Scenario 3
5: Mass Ave. & Driveway #1

PM Peak Hour

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑			
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	82	2615	1013	101	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	89	2842	1101	110	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type						
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked	0.74			0.75	0.74	
vC, conflicting volume	1211			2282	605	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	933			823	115	
tC, single (s)	4.1			6.8	6.9	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	83			100	100	
cM capacity (veh/h)	539			195	677	
Direction, Lane #						
Volume Total	658	1137	1137	734	477	
Volume Left	89	0	0	0	0	
Volume Right	0	0	0	0	110	
cSH	539	1700	1700	1700	1700	
Volume to Capacity	0.17	0.67	0.67	0.43	0.28	
Queue Length 95th (ft)	15	0	0	0	0	
Control Delay (s)	4.5	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	1.0			0.0		
Approach LOS						
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			99.3%		ICU Level of Service	F
Analysis Period (min)			15			

2030 Future Conditions - Scenario 3
6: Mass Ave. & Driveway #2

PM Peak Hour

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑		↑	↑
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	2582	1013	0	115	76
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2807	1101	0	125	83
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type						
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked	0.79			0.72	0.79	
vC, conflicting volume	1101			2037	551	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	860			643	161	
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			57	88	
cM capacity (veh/h)	613			294	674	
Direction, Lane #						
Volume Total	936	936	936	551	551	125
Volume Left	0	0	0	0	0	125
Volume Right	0	0	0	0	0	83
cSH	1700	1700	1700	1700	1700	294
Volume to Capacity	0.55	0.55	0.55	0.32	0.32	0.43
Queue Length 95th (ft)	0	0	0	0	0	51
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	26.0
Lane LOS						D
Approach Delay (s)	0.0			0.0		20.1
Approach LOS						C
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			69.2%		ICU Level of Service	C
Analysis Period (min)			15			

F-31

2030 Future Conditions - Scenario 3
9: M St. & 9th St

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕		⇕		⇕		⇕		⇕		⇕
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		0.95		0.95		1.00
Frt		0.96		1.00		0.85		0.99		1.00		1.00
Fit Protected		0.99		0.95		1.00		1.00		0.99		0.99
Satd. Flow (prot)		1765		1770		1583		3497		3510		1900
Fit Permitted		0.99		0.53		1.00		1.00		0.83		0.83
Satd. Flow (perm)		1765		985		1583		3497		2931		1900
Volume (vph)	55	121	81	73	0	69	0	290	25	68	336	0
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)	60	132	88	79	0	75	0	315	27	74	365	0
RTOR Reduction (vph)	0	16	0	0	0	0	0	7	0	0	0	0
Lane Group Flow (vph)	0	264	0	79	0	75	0	336	0	0	439	0
Turn Type	Perm		custom		Free				Perm			
Protected Phases		6					4				8	
Permitted Phases	6		2		Free				8			
Actuated Green, G (s)	41.0		41.0		100.0		50.0		50.0		50.0	
Effective Green, g (s)	42.0		42.0		100.0		50.0		50.0		50.0	
Actuated g/C Ratio	0.42		0.42		1.00		0.50		0.50		0.50	
Clearance Time (s)	5.0		5.0		4.0		4.0		4.0		4.0	
Lane Grp Cap (vph)	741		414		1583		1749		1466		1466	
v/s Ratio Prot							0.10					
v/s Ratio Perm	0.15		0.08		0.05						0.15	
v/c Ratio	0.36		0.19		0.05		0.19		0.30		0.30	
Uniform Delay, d1	19.8		18.3		0.0		13.8		14.7		14.7	
Progression Factor	1.82		1.00		1.00		1.01		1.00		1.00	
Incremental Delay, d2	1.3		1.0		0.1		0.2		0.5		0.5	
Delay (s)	37.2		19.3		0.1		14.2		15.2		15.2	
Level of Service	D		B		A		B		B		B	
Approach Delay (s)	37.2				9.9		14.2		15.2		15.2	
Approach LOS	D				A		B		B		B	
Intersection Summary												
HCM Average Control Delay		19.3			HCM Level of Service		B					
HCM Volume to Capacity ratio		0.33										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)		8.0					
Intersection Capacity Utilization		51.1%			ICU Level of Service		A					
Analysis Period (min)		15										
c Critical Lane Group												

2030 Future Conditions - Scenario 3
10: M St. & 10th St

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕		⇕		⇕		⇕		⇕		⇕
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
Frt		0.98		1.00		1.00		1.00		0.98		0.98
Fit Protected		1.00		0.98		0.98		0.98		0.99		0.99
Satd. Flow (prot)		1825		1817		1817		1817		1814		1814
Fit Permitted		1.00		0.93		0.93		0.93		0.99		0.99
Satd. Flow (perm)		1825		1734		1734		1734		1814		1814
Volume (vph)	0	272	49	1	1	0	0	0	0	0	31	96
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	296	53	1	1	0	0	0	0	0	34	104
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	0	5
Lane Group Flow (vph)	0	343	0	0	2	0	0	0	0	0	0	151
Turn Type		Perm		Perm		Perm		Perm		Perm		Perm
Protected Phases		6		2		2		2		8		8
Permitted Phases		6		2		2		2		8		8
Actuated Green, G (s)		45.0		45.0		45.0		45.0		44.0		44.0
Effective Green, g (s)		47.0		47.0		47.0		47.0		45.0		45.0
Actuated g/C Ratio		0.47		0.47		0.47		0.47		0.45		0.45
Clearance Time (s)		6.0		6.0		6.0		6.0		5.0		5.0
Lane Grp Cap (vph)		858		815		815		815		816		816
v/s Ratio Prot		0.19										
v/s Ratio Perm				0.00		0.00		0.00		0.08		0.08
v/c Ratio		0.40		0.00		0.00		0.00		0.19		0.19
Uniform Delay, d1		17.3		14.1		14.1		14.1		18.5		18.5
Progression Factor		1.00		1.00		1.00		1.00		1.00		1.00
Incremental Delay, d2		1.4		0.0		0.0		0.0		0.5		0.5
Delay (s)		18.7		14.1		14.1		14.1		17.0		17.0
Level of Service		B		B		B		B		B		B
Approach Delay (s)		18.7		14.1		14.1		14.1		17.0		17.0
Approach LOS		B		B		B		B		B		B
Intersection Summary												
HCM Average Control Delay		18.1			HCM Level of Service		B					
HCM Volume to Capacity ratio		0.29										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)		8.0					
Intersection Capacity Utilization		31.8%			ICU Level of Service		A					
Analysis Period (min)		15										
c Critical Lane Group												

2030 Future Conditions - Scenario 3 (w/ impr.)
1: L St & 9th St

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
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		
Lane Util. Factor	0.95			0.95			0.95			0.95		
Frbp, ped/bikes	1.00			0.99			0.99			1.00		
Flpb, ped/bikes	1.00			1.00			1.00			1.00		
Frt	1.00			0.97			0.98			0.99		
Flt Protected	1.00			0.99			1.00			1.00		
Satd. Flow (prot)	3156			2845			3084			3126		
Flt Permitted	0.88			0.82			0.84			0.93		
Satd. Flow (perm)	2784			2349			2587			2903		
Volume (vph)	27	239	5	81	255	100	12	188	37	56	1313	121
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)	29	260	5	88	277	109	13	204	40	61	1427	132
RTOR Reduction (vph)	0	1	0	0	28	0	0	15	0	0	7	0
Lane Group Flow (vph)	0	293	0	0	446	0	0	242	0	0	1613	0
Confl. Peds. (#/hr)	25		31	31	25		60		46	46		60
Parking (#/hr)			2		2							
Turn Type	Perm		Perm		Perm		Perm		Perm			
Protected Phases	6		2		4		8				8	
Permitted Phases	6		2		4		8				8	
Actuated Green, G (s)	34.0		34.0		54.0		54.0				54.0	
Effective Green, g (s)	36.0		36.0		56.0		56.0				56.0	
Actuated g/C Ratio	0.36		0.36		0.56		0.56				0.56	
Clearance Time (s)	6.0		6.0		6.0		6.0				6.0	
Lane Grp Cap (vph)	1002		846		1449		1626					
v/s Ratio Prot											c0.11	
v/s Ratio Perm	0.11		c0.19		0.09		c0.56					
v/c Ratio	0.29		0.53		0.17		0.99					
Uniform Delay, d1	22.9		25.3		10.7		21.8					
Progression Factor	0.92		1.00		0.63		0.88					
Incremental Delay, d2	0.7		2.3		0.2		20.5					
Delay (s)	21.7		27.6		6.9		39.7					
Level of Service	C		C		A		D					
Approach Delay (s)	21.7		27.6		6.9		39.7					
Approach LOS	C		C		A		D					
Intersection Summary												
HCM Average Control Delay	32.4		HCM Level of Service		C							
HCM Volume to Capacity ratio	0.81											
Actuated Cycle Length (s)	100.0		Sum of lost time (s)		8.0							
Intersection Capacity Utilization	151.0%		ICU Level of Service		H							
Analysis Period (min)	15											
c Critical Lane Group												

2030 Future Conditions - Scenario 3 (w/ impr.)
2: L St & 10th St

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
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		
Lane Util. Factor	0.91			0.91			1.00			1.00		
Frbp, ped/bikes	1.00			1.00			1.00			0.96		0.98
Flpb, ped/bikes	0.96			1.00			0.96			1.00		1.00
Frt	1.00			1.00			1.00			0.85		0.96
Flt Protected	0.95			1.00			0.95			1.00		1.00
Satd. Flow (prot)	1386			3037			1522			1374		1401
Flt Permitted	0.95			1.00			0.63			1.00		1.00
Satd. Flow (perm)	1386			3037			1014			1374		1401
Volume (vph)	0	0	0	132	249	0	90	0	273	0	105	46
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	0	0	143	271	0	98	0	297	0	114	50
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	160	0	16	0
Lane Group Flow (vph)	0	0	0	129	285	0	98	0	137	0	148	0
Confl. Peds. (#/hr)	71		67		71		87		37		87	
Parking (#/hr)											2	
Turn Type	Perm		custom		custom		Perm				8	
Protected Phases	2		2		4		4				8	
Permitted Phases	2		2		4		4				8	
Actuated Green, G (s)	45.0		45.0		45.0		45.0				45.0	
Effective Green, g (s)	46.0		46.0		46.0		46.0				46.0	
Actuated g/C Ratio	0.46		0.46		0.46		0.46				0.46	
Clearance Time (s)	5.0		5.0		5.0		5.0				5.0	
Lane Grp Cap (vph)	638		1397		466		632				644	
v/s Ratio Prot											c0.11	
v/s Ratio Perm	0.09		0.09		0.10		0.10					
v/c Ratio	0.20		0.20		0.21		0.22				0.23	
Uniform Delay, d1	16.1		16.1		16.1		16.2				16.3	
Progression Factor	0.64		0.64		1.07		1.40				1.49	
Incremental Delay, d2	0.5		0.2		0.4		0.3				0.8	
Delay (s)	10.8		10.6		17.6		22.9				25.0	
Level of Service	B		B		B		C				C	
Approach Delay (s)	0.0		10.6		21.6		25.0					
Approach LOS	A		B		C		C					
Intersection Summary												
HCM Average Control Delay	17.5		HCM Level of Service		B							
HCM Volume to Capacity ratio	0.22											
Actuated Cycle Length (s)	100.0		Sum of lost time (s)		8.0							
Intersection Capacity Utilization	50.0%		ICU Level of Service		A							
Analysis Period (min)	15											
c Critical Lane Group												

11-33

2030 Future Conditions - Scenario 3 (w/ impr.)
3: Mass Ave. & 9th St

PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑						↑↑	
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	
Lane Util. Factor		0.95	1.00		0.95						0.91	
Frbp, ped/bikes		1.00	0.68		0.94						0.97	
Flpb, ped/bikes		1.00	1.00		1.00						0.99	
Frt		1.00	0.85		0.97						0.99	
Flt Protected		1.00	1.00		1.00						1.00	
Satd. Flow (prot)		3185	975		2910						4375	
Flt Permitted		1.00	1.00		0.95						1.00	
Satd. Flow (perm)		3185	975		2777						4375	
Volume (vph)	0	1682	934	1	1016	238	0	0	0	54	1256	98
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	1828	1015	1	1104	259	0	0	0	59	1365	107
RTOR Reduction (vph)	0	0	0	0	20	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	1828	1015	0	1344	0	0	0	0	0	1527	0
Confl. Peds. (#/hr)	744	433	433		744	512			127	127		512
Turn Type		Perm	Perm						Perm			
Protected Phases		6			2							8
Permitted Phases			6	2	2					8		
Actuated Green, G (s)		68.0	68.0		66.0						24.0	
Effective Green, g (s)		66.0	66.0		66.0						26.0	
Actuated g/C Ratio		0.66	0.66		0.66						0.26	
Clearance Time (s)		2.0	2.0		4.0						6.0	
Lane Grp Cap (vph)		2102	644		1833						1138	
w/s Ratio Prot		0.57									0.35	
w/s Ratio Perm			c1.04		0.48							0.35
w/c Ratio		0.87	1.58		0.73						1.34	
Uniform Delay, d1		13.6	17.0		11.2						37.0	
Progression Factor		0.50	0.56		1.00						0.56	
Incremental Delay, d2		0.5	259.9		2.6						155.8	
Delay (s)		7.3	269.5		13.8						176.5	
Level of Service		A	F		B						F	
Approach Delay (s)		100.9			13.8			0.0			176.5	
Approach LOS		F			B			A			F	
Intersection Summary												
HCM Average Control Delay		100.4			HCM Level of Service						F	
HCM Volume to Capacity ratio		1.51										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)						8.0	
Intersection Capacity Utilization		170.1%			ICU Level of Service						H	
Analysis Period (min)		15										
c Critical Lane Group												

2030 Future Conditions - Scenario 3 (w/ impr.)
4: Mass Ave. & 10th St

PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑						↑↑	
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	
Lane Util. Factor		1.00	0.95		0.95						0.95	
Frbp, ped/bikes		1.00	1.00		0.99						0.99	
Flpb, ped/bikes		1.00	1.00		1.00						0.90	
Frt		1.00	0.99		0.99						0.99	
Flt Protected		0.95	1.00		0.99						0.98	
Satd. Flow (prot)		1591	3151		3108						2754	
Flt Permitted		0.19	1.00		0.50						0.98	
Satd. Flow (perm)		318	3151		1554						2754	
Volume (vph)	273	2511	146	150	849	90	0	0	0	72	97	6
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)	297	2729	159	163	923	98	0	0	0	78	105	7
RTOR Reduction (vph)	0	4	0	0	7	0	0	0	0	0	3	0
Lane Group Flow (vph)	297	2884	0	0	1177	0	0	0	0	0	187	0
Confl. Peds. (#/hr)	96		64	64		96	93		84	84		93
Turn Type		pm+pt			Perm						Perm	
Protected Phases		1	6			2						8
Permitted Phases			6		2						8	
Actuated Green, G (s)		80.0	80.0		70.0						10.0	
Effective Green, g (s)		81.0	81.0		71.0						11.0	
Actuated g/C Ratio		0.81	0.81		0.71						0.11	
Clearance Time (s)		4.0	5.0		5.0						5.0	
Lane Grp Cap (vph)		334	2552		1103						303	
w/s Ratio Prot		0.05	c0.92									
w/s Ratio Perm		0.67			0.76						0.07	
w/c Ratio		0.89	1.13		2.23dl						0.62	
Uniform Delay, d1		6.8	9.5		14.5						42.5	
Progression Factor		1.00	1.00		0.98						0.91	
Incremental Delay, d2		27.8	64.1		42.5						9.0	
Delay (s)		34.6	73.6		56.7						47.8	
Level of Service		C	E		E						D	
Approach Delay (s)		70.0			56.7			0.0			47.8	
Approach LOS		E			E			A			D	
Intersection Summary												
HCM Average Control Delay		65.6			HCM Level of Service						E	
HCM Volume to Capacity ratio		1.07										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)						8.0	
Intersection Capacity Utilization		152.8%			ICU Level of Service						H	
Analysis Period (min)		15										
dl Defacto Left Lane. Recode with 1 though lane as a left lane. c Critical Lane Group												

2030 Future Conditions - Scenario 3 (w/ impr.)
9: M St. & 9th St

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕		↘	↙	↕		↘	↙	↕		↘	↙
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		0.95		0.95		0.95	
Frt	0.96		1.00		0.85		0.99		1.00		0.99	
Flt Protected	0.99		0.95		1.00		1.00		0.99		0.99	
Satd. Flow (prot)	1765		1770		1583		3497		3510		3510	
Flt Permitted	0.99		0.53		1.00		1.00		0.83		0.83	
Satd. Flow (perm)	1765		985		1583		3497		2931		2931	
Volume (vph)	55	121	81	73	0	69	0	290	25	68	336	0
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)	60	132	88	79	0	75	0	315	27	74	365	0
RTOR Reduction (vph)	0	16	0	0	0	0	0	7	0	0	0	0
Lane Group Flow (vph)	0	264	0	79	0	75	0	336	0	0	439	0
Turn Type	Perm		custom		Free		Perm		Perm		Perm	
Protected Phases	6						4				8	
Permitted Phases	6		2		Free				8			
Actuated Green, G (s)	41.0		41.0		100.0		50.0		50.0		50.0	
Effective Green, g (s)	42.0		42.0		100.0		50.0		50.0		50.0	
Actuated g/C Ratio	0.42		0.42		1.00		0.50		0.50		0.50	
Clearance Time (s)	5.0		5.0		4.0		4.0		4.0		4.0	
Lane Grp Cap (vph)	741		414		1583		1749		1466		1466	
v/s Ratio Prot	0.15		0.08		0.05		0.10		c0.15		c0.15	
v/c Ratio	0.36		0.19		0.05		0.19		0.30		0.30	
Uniform Delay, d1	19.8		18.3		0.0		13.8		14.7		14.7	
Progression Factor	1.82		1.00		1.00		1.49		1.00		1.00	
Incremental Delay, d2	1.3		1.0		0.1		0.2		0.5		0.5	
Delay (s)	37.2		19.3		0.1		20.8		15.2		15.2	
Level of Service	D		B		A		C		B		B	
Approach Delay (s)	37.2				9.9		20.8		15.2		15.2	
Approach LOS	D				A		C		B		B	

Intersection Summary			
HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

2030 Future Conditions - Scenario 3 (w/ impr.)
10: M St. & 10th St

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕		↘	↙	↕		↘	↙	↕		↘	↙
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		0.98		0.98		0.98	
Frt	0.98		1.00		0.98		0.98		0.98		0.98	
Flt Protected	1.00		0.98		1.00		1.00		0.99		0.99	
Satd. Flow (prot)	1825		1817		1817		1817		1814		1814	
Flt Permitted	1.00		0.93		0.93		0.93		0.99		0.99	
Satd. Flow (perm)	1825		1734		1734		1734		1814		1814	
Volume (vph)	0	272	49	1	1	0	0	0	0	31	96	17
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	296	53	1	1	0	0	0	0	34	104	18
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	343	0	0	2	0	0	0	0	0	151	0
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	6		2		2		2		8		8	
Permitted Phases	6		2		8		8		8		8	
Actuated Green, G (s)	45.0		45.0		45.0		45.0		44.0		44.0	
Effective Green, g (s)	47.0		47.0		47.0		47.0		45.0		45.0	
Actuated g/C Ratio	0.47		0.47		0.47		0.47		0.45		0.45	
Clearance Time (s)	6.0		6.0		6.0		6.0		5.0		5.0	
Lane Grp Cap (vph)	858		815		815		815		816		816	
v/s Ratio Prot	c0.19		0.00		0.00		0.00		0.08		0.08	
v/c Ratio	0.40		0.00		0.00		0.00		0.19		0.19	
Uniform Delay, d1	17.3		14.1		14.1		14.1		16.5		16.5	
Progression Factor	1.00		1.00		1.00		1.00		1.00		1.00	
Incremental Delay, d2	1.4		0.0		0.0		0.0		0.5		0.5	
Delay (s)	18.7		14.1		14.1		14.1		17.0		17.0	
Level of Service	B		B		B		B		B		B	
Approach Delay (s)	18.7		14.1		0.0		0.0		17.0		17.0	
Approach LOS	B		B		A		A		B		B	

Intersection Summary			
HCM Average Control Delay	18.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	31.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

F-36

2030 Future Conditions - Scenario 3 (w/ impr.)
5: Mass Ave. & Driveway #1

PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑			
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	82	2615	1013	101	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	89	2842	1101	110	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (ft)		350	274			
pX, platoon unblocked	0.74			0.41	0.74	
vC, conflicting volume	1211			2282	605	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	933			0	115	
tC, single (s)	4.1			6.8	6.9	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	83			100	100	
cM capacity (veh/h)	539			353	677	
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	
Volume Total	658	1137	1137	734	477	
Volume Left	89	0	0	0	0	
Volume Right	0	0	0	0	110	
cSH	539	1700	1700	1700	1700	
Volume to Capacity	0.17	0.67	0.67	0.43	0.28	
Queue Length 95th (ft)	15	0	0	0	0	
Control Delay (s)	4.5	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	1.0			0.0		
Approach LOS						
Intersection Summary						
Average Delay	0.7					
Intersection Capacity Utilization	99.3%		ICU Level of Service		F	
Analysis Period (min)	15					

2030 Future Conditions - Scenario 3 (w/ impr.)
6: Mass Ave. & Driveway #2

PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations		↑↑↑	↑↑		↑	↑	
Sign Control		Free	Free		Stop		
Grade		0%	0%		0%		
Volume (veh/h)	0	2582	1013	0	115	76	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	0	2807	1101	0	125	83	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type					None		
Median storage (veh)							
Upstream signal (ft)		236	388				
pX, platoon unblocked	0.79				0.36	0.79	
vC, conflicting volume	1101				2037	551	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	860				0	161	
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				66	88	
cM capacity (veh/h)	613				372	674	
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	936	936	936	551	551	125	83
Volume Left	0	0	0	0	0	125	0
Volume Right	0	0	0	0	0	0	83
cSH	1700	1700	1700	1700	1700	372	674
Volume to Capacity	0.55	0.55	0.55	0.32	0.32	0.34	0.12
Queue Length 95th (ft)	0	0	0	0	0	36	10
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	19.5	11.1
Lane LOS						C	B
Approach Delay (s)	0.0			0.0		16.2	
Approach LOS						C	
Intersection Summary							
Average Delay	0.8						
Intersection Capacity Utilization	69.2%		ICU Level of Service		C		
Analysis Period (min)	15						

F-35

2030 Future Conditions - Scenario 3
5: Mass Ave. & Driveway 1

AM Peak Hour

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑↑↑	↑↑				
Sign Control	Free	Free		Stop		
Grade	0%	0%		0%		
Volume (veh/h)	92	1845	1671	115	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	100	2005	1816	125	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type: None						
Median storage (veh)						
Upstream signal (ft): 350, 274						
pX, platoon unblocked	0.50			0.68	0.50	
vC, conflicting volume	1941			2747	971	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1882			914	0	
tC, single (s)	4.1			6.8	6.9	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	36			100	100	
cM capacity (veh/h)	156			67	539	
Direction, Lane #						
Volume Total	501	802	802	1211	730	
Volume Left	100	0	0	0	0	
Volume Right	0	0	0	0	125	
cSH	156	1700	1700	1700	1700	
Volume to Capacity	0.64	0.47	0.47	0.71	0.43	
Queue Length 95th (ft)	89	0	0	0	0	
Control Delay (s)	53.8	0.0	0.0	0.0	0.0	
Lane LOS	F					
Approach Delay (s)	12.8			0.0		
Approach LOS						
Intersection Summary						
Average Delay			6.7			
Intersection Capacity Utilization		103.7%		ICU Level of Service	G	
Analysis Period (min)		15				

2030 Future Conditions - Scenario 3
6: Mass Ave. & Driveway 2

AM Peak Hour

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑↑↑	↑↑			↑	↑
Sign Control	Free	Free		Stop		
Grade	0%	0%		0%		
Volume (veh/h)	0	1846	1671	0	91	60
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2007	1816	0	99	65
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type: None						
Median storage (veh)						
Upstream signal (ft): 236, 388						
pX, platoon unblocked	0.51			0.71	0.51	
vC, conflicting volume	1816			2485	908	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1643			524	0	
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			71	88	
cM capacity (veh/h)	201			341	558	
Direction, Lane #						
Volume Total	669	669	669	908	908	99
Volume Left	0	0	0	0	0	99
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	341
Volume to Capacity	0.39	0.39	0.39	0.53	0.53	0.29
Queue Length 95th (ft)	0	0	0	0	0	30
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	19.8
Lane LOS						C
Approach Delay (s)	0.0			0.0		16.8
Approach LOS						C
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization		63.6%		ICU Level of Service	B	
Analysis Period (min)		15				

F-23

2030 Future Conditions - Scenario 3
9: M St. & 9th St

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕		↔	↕		↔	↕		↔		↕	
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		0.95		0.95		0.95	
Frt	0.93		1.00		0.85		0.98		1.00		1.00	
Flt Protected	0.99		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (prot)	1717		1770		1583		3474		3533		3533	
Flt Permitted	0.99		0.65		1.00		1.00		0.94		0.94	
Satd. Flow (perm)	1717		1203		1583		3474		3310		3310	
Volume (vph)	25	49	81	93	0	20	0	105	15	57	1462	0
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)	27	53	88	101	0	22	0	114	16	62	1589	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	9	0	0	0	0
Lane Group Flow (vph)	0		165		0		101		0		22	
Turn Type	Perm		custom		Free		Perm		Perm		Perm	
Protected Phases	6		6		2		Free		4		8	
Permitted Phases	6		2		Free		8		8		8	
Actuated Green, G (s)	50.0		50.0		100.0		41.0		41.0		41.0	
Effective Green, g (s)	50.0		50.0		100.0		42.0		42.0		42.0	
Actuated g/C Ratio	0.50		0.50		1.00		0.42		0.42		0.42	
Clearance Time (s)	4.0		4.0		5.0		5.0		5.0		5.0	
Lane Grp Cap (vph)	859		602		1583		1459		1390		1390	
v/s Ratio Prot	0.10		0.08		0.01		0.03		c0.50		c0.50	
v/c Ratio Perm	0.19		0.17		0.01		0.08		1.19		1.19	
Uniform Delay, d1	13.8		13.6		0.0		17.4		29.0		29.0	
Progression Factor	0.57		1.00		1.00		0.93		1.00		1.00	
Incremental Delay, d2	0.5		0.6		0.0		0.1		92.0		92.0	
Delay (s)	8.4		14.2		0.0		16.3		121.0		121.0	
Level of Service	A		B		A		B		F		F	
Approach Delay (s)	8.4		11.7		16.3		121.0		121.0		121.0	
Approach LOS	A		B		B		F		F		F	
Intersection Summary												
HCM Average Control Delay	98.8		HCM Level of Service		F		F		F		F	
HCM Volume to Capacity ratio	0.65		Sum of lost time (s)		8.0		8.0		8.0		8.0	
Actuated Cycle Length (s)	100.0		ICU Level of Service		C		C		C		C	
Intersection Capacity Utilization	69.5%		Analysis Period (min)		15		15		15		15	
Analysis Period (min)	15		c Critical Lane Group		c Critical Lane Group		c Critical Lane Group		c Critical Lane Group		c Critical Lane Group	

2030 Future Conditions - Scenario 3
10: M St. & 10th St

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕		↔		↕		↔		↕		↔	
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	
Frt	0.96		1.00		0.98		1.00		1.00		1.00	
Flt Protected	1.00		0.98		1.00		1.00		1.00		1.00	
Satd. Flow (prot)	1788		1829		1840		1840		1840		1840	
Flt Permitted	1.00		0.94		0.99		0.99		0.99		0.99	
Satd. Flow (perm)	1788		1744		1840		1840		1840		1840	
Volume (vph)	0	131	55	4	6	0	0	0	0	21	177	11
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	142	60	4	7	0	0	0	0	23	192	12
RTOR Reduction (vph)	0	15	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0		187		0		11		0		225	
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	6		2		2		8		8		8	
Permitted Phases	6		2		2		8		8		8	
Actuated Green, G (s)	45.0		45.0		45.0		44.0		44.0		44.0	
Effective Green, g (s)	47.0		47.0		47.0		45.0		45.0		45.0	
Actuated g/C Ratio	0.47		0.47		0.45		0.45		0.45		0.45	
Clearance Time (s)	6.0		6.0		5.0		5.0		5.0		5.0	
Lane Grp Cap (vph)	840		820		828		828		828		828	
v/s Ratio Prot	c0.10		0.01		0.12		0.12		0.12		0.12	
v/c Ratio Perm	0.22		0.01		0.27		0.27		0.27		0.27	
Uniform Delay, d1	15.7		14.1		17.2		17.2		17.2		17.2	
Progression Factor	1.00		1.00		1.00		1.00		1.00		1.00	
Incremental Delay, d2	0.6		0.0		0.8		0.8		0.8		0.8	
Delay (s)	16.3		14.2		18.0		18.0		18.0		18.0	
Level of Service	B		B		B		B		B		B	
Approach Delay (s)	16.3		14.2		0.0		18.0		18.0		18.0	
Approach LOS	B		B		A		B		B		B	
Intersection Summary												
HCM Average Control Delay	17.1		HCM Level of Service		B		B		B		B	
HCM Volume to Capacity ratio	0.25		Sum of lost time (s)		8.0		8.0		8.0		8.0	
Actuated Cycle Length (s)	100.0		ICU Level of Service		A		A		A		A	
Intersection Capacity Utilization	28.1%		Analysis Period (min)		15		15		15		15	
Analysis Period (min)	15		c Critical Lane Group		c Critical Lane Group		c Critical Lane Group		c Critical Lane Group		c Critical Lane Group	

2030 Future Conditions - Scenario 3 (w/ impr.)
1: L St & 9th St

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
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		
Lane Util. Factor	0.95			0.95			0.95			0.95		
Frbp, ped/bikes	1.00			0.99			0.99			1.00		
Flpb, ped/bikes	1.00			0.99			1.00			1.00		
Frt	1.00			0.98			0.99			0.99		
Flt Protected	1.00			0.99			0.99			1.00		
Satd. Flow (prot)	3152			2894			3106			3144		
Flt Permitted	0.88			0.83			0.81			0.94		
Satd. Flow (perm)	2775			2414			2544			2967		
Volume (vph)	17	156	4	127	427	64	6	39	4	54	1512	70
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)	18	170	4	138	464	70	7	42	4	59	1643	76
RTOR Reduction (vph)	0	1	0	0	9	0	0	2	0	0	3	0
Lane Group Flow (vph)	0	191	0	0	663	0	0	51	0	0	1775	0
Confl. Peds. (#/hr)	54		54	54	54	69	135		135	69		
Parking (#/hr)			2	2								
Turn Type	Perm		Perm		Perm		Perm		Perm			
Protected Phases	6		2		2		4		4		8	
Permitted Phases	6		2		2		4		4		8	
Actuated Green, G (s)	35.0		35.0		35.0		53.0		53.0		53.0	
Effective Green, g (s)	37.0		37.0		37.0		55.0		55.0		55.0	
Actuated g/C Ratio	0.37		0.37		0.37		0.55		0.55		0.55	
Clearance Time (s)	6.0		6.0		6.0		6.0		6.0		6.0	
Lane Grp Cap (vph)	1027		893		1399		1632		1632		1632	
v/s Ratio Prot												
v/s Ratio Perm	0.07		c0.27		0.02		c0.60		0.02		c0.60	
v/c Ratio	0.19		0.74		0.04		1.09		0.04		1.09	
Uniform Delay, d1	21.3		27.4		10.3		22.5		10.3		22.5	
Progression Factor	0.75		1.00		1.01		0.32		1.01		0.32	
Incremental Delay, d2	0.4		5.6		0.0		44.2		0.0		44.2	
Delay (s)	16.4		32.9		10.5		51.4		10.5		51.4	
Level of Service	B		C		B		D		B		D	
Approach Delay (s)	16.4		32.9		10.5		51.4		10.5		51.4	
Approach LOS	B		C		B		D		B		D	
Intersection Summary												
HCM Average Control Delay	43.5		HCM Level of Service		D		D		D		D	
HCM Volume to Capacity ratio	0.95		0.95		0.95		0.95		0.95		0.95	
Actuated Cycle Length (s)	100.0		Sum of lost time (s)		8.0		8.0		8.0		8.0	
Intersection Capacity Utilization	122.5%		ICU Level of Service		H		H		H		H	
Analysis Period (min)	15		15		15		15		15		15	
c Critical Lane Group												

2030 Future Conditions - Scenario 3 (w/ impr.)
2: L St & 10th St

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
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		
Lane Util. Factor	0.91			0.91			0.91			0.91		
Frbp, ped/bikes	1.00			1.00			1.00			0.92		0.99
Flpb, ped/bikes	0.91			1.00			0.97			1.00		1.00
Frt	1.00			1.00			1.00			0.85		0.97
Flt Protected	0.95			1.00			0.95			1.00		1.00
Satd. Flow (prot)	1321			3051			1539			1314		1435
Flt Permitted	0.95			1.00			0.56			1.00		1.00
Satd. Flow (perm)	1321			3051			905			1314		1435
Volume (vph)	0	0	0	149	372	0	137	0	182	0	184	45
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	0	0	162	404	0	149	0	198	0	200	49
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	117	0	9	0
Lane Group Flow (vph)	0	0	0	162	404	0	149	0	81	0	240	0
Confl. Peds. (#/hr)	103		121	121	103	84	92		92	84		
Parking (#/hr)											2	
Turn Type	Perm		custom		custom		custom		custom			
Protected Phases	2		2		2		8		2		8	
Permitted Phases	2		2		2		8		2		8	
Actuated Green, G (s)	40.0		40.0		50.0		40.0		40.0		50.0	
Effective Green, g (s)	41.0		41.0		51.0		41.0		41.0		51.0	
Actuated g/C Ratio	0.41		0.41		0.51		0.41		0.41		0.51	
Clearance Time (s)	5.0		5.0		5.0		5.0		5.0		5.0	
Lane Grp Cap (vph)	542		1251		462		539		732		732	
v/s Ratio Prot											c0.17	
v/s Ratio Perm	0.12		0.13		0.16		0.06		0.16		0.06	
v/c Ratio	0.30		0.32		0.32		0.15		0.32		0.33	
Uniform Delay, d1	19.8		20.1		14.4		18.6		14.4		14.4	
Progression Factor	0.73		0.71		1.43		1.00		2.11		2.11	
Incremental Delay, d2	0.9		0.4		0.2		0.1		1.2		1.2	
Delay (s)	15.4		14.6		20.7		18.6		31.5		31.5	
Level of Service	B		B		C		B		C		C	
Approach Delay (s)	0.0		14.8		19.5		31.5		31.5		31.5	
Approach LOS	A		B		B		C		C		C	
Intersection Summary												
HCM Average Control Delay	19.8		HCM Level of Service		B		B		B		B	
HCM Volume to Capacity ratio	0.33		0.33		0.33		0.33		0.33		0.33	
Actuated Cycle Length (s)	100.0		Sum of lost time (s)		8.0		8.0		8.0		8.0	
Intersection Capacity Utilization	48.5%		ICU Level of Service		A		A		A		A	
Analysis Period (min)	15		15		15		15		15		15	
c Critical Lane Group												

F-25

2030 Future Conditions - Scenario 3 (w/ impr.)
3: Mass Ave. & 9th St

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑						↑↑↑	
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	
Lane Util. Factor	0.95	1.00			0.95						0.91	
Frpb, ped/bikes	1.00	0.89			1.00						0.98	
Flpb, ped/bikes	1.00	1.00			1.00						1.00	
Frt	1.00	0.85			1.00						0.99	
Flt Protected	1.00	1.00			1.00						1.00	
Satd. Flow (prot)		3185	1261		3156						4456	
Flt Permitted	1.00	1.00			0.95						1.00	
Satd. Flow (perm)		3185	1261		2993						4456	
Volume (vph)	0	907	938	10	1703	49	0	0	0	27	1540	84
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	986	1020	11	1851	53	0	0	0	29	1674	91
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	986	1020	0	1913	0	0	0	0	0	1790	0
Confl. Peds. (#/hr)	359		140	140		359	205		134	134		205
Turn Type		Perm	Perm							Perm		
Protected Phases		6			2						8	
Permitted Phases			6	2	2					8		
Actuated Green, G (s)		68.0	68.0		66.0						24.0	
Effective Green, g (s)		66.0	66.0		66.0						26.0	
Actuated g/C Ratio		0.66	0.66		0.66						0.26	
Clearance Time (s)		2.0	2.0		4.0						6.0	
Lane Grp Cap (vph)		2102	832		1975						1159	
v/s Ratio Prot		0.31										
v/s Ratio Perm			c0.81		0.64						0.40	
v/c Ratio		0.47	1.23		0.97						1.54	
Uniform Delay, d1		8.4	17.0		16.0						37.0	
Progression Factor		0.17	0.24		1.00						0.76	
Incremental Delay, d2		0.3	105.6		14.1						245.5	
Delay (s)		1.7	109.7		30.1						273.5	
Level of Service		A	F		C						F	
Approach Delay (s)		56.6			30.1		0.0				273.5	
Approach LOS		E			C		A				F	
Intersection Summary												
HCM Average Control Delay			115.8			HCM Level of Service					F	
HCM Volume to Capacity ratio			1.32									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)					8.0	
Intersection Capacity Utilization			172.6%			ICU Level of Service					H	
Analysis Period (min)			15									
c Critical Lane Group												

2030 Future Conditions - Scenario 3 (w/ impr.)
4: Mass Ave. & 10th St

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↑↑		↑↑						↑↑	
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	
Lane Util. Factor	1.00	0.95			0.95						0.95	
Frpb, ped/bikes	1.00	1.00			0.99						1.00	
Flpb, ped/bikes	1.00	1.00			1.00						0.99	
Frt	1.00	0.99			0.99						1.00	
Flt Protected	0.95	1.00			0.99						0.99	
Satd. Flow (prot)	1593	3137			3098						3083	
Flt Permitted	0.07	1.00			0.51						0.99	
Satd. Flow (perm)	112	3137			1598						3083	
Volume (vph)	182	1767	159	337	1257	137	0	0	0	79	235	6
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)	198	1921	173	366	1366	149	0	0	0	86	255	7
RTOR Reduction (vph)	0	7	0	0	6	0	0	0	0	0	1	0
Lane Group Flow (vph)	198	2087	0	0	1875	0	0	0	0	0	347	0
Confl. Peds. (#/hr)	116		41	41		116	118		48	48		118
Turn Type		pm+pt			Perm						Perm	
Protected Phases		1	6			2						8
Permitted Phases					2						8	
Actuated Green, G (s)		65.0	65.0			55.0						25.0
Effective Green, g (s)		66.0	66.0			56.0						26.0
Actuated g/C Ratio		0.68	0.66			0.58						0.26
Clearance Time (s)		4.0	5.0			5.0						5.0
Lane Grp Cap (vph)		163	2070			895						802
v/s Ratio Prot		0.07	c0.67									
v/s Ratio Perm		0.73				c1.17						0.11
v/c Ratio		1.21	1.01			5.01dl						0.43
Uniform Delay, d1		30.5	17.0			22.0						30.8
Progression Factor		1.00	1.00			0.79						0.68
Incremental Delay, d2		139.8	21.8			493.8						1.6
Delay (s)		170.3	38.8			511.1						22.5
Level of Service		F	D			F						C
Approach Delay (s)			50.2			511.1		0.0				22.5
Approach LOS			D			F		A				C
Intersection Summary												
HCM Average Control Delay			239.8			HCM Level of Service					F	
HCM Volume to Capacity ratio			1.55									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)					12.0	
Intersection Capacity Utilization			145.9%			ICU Level of Service					H	
Analysis Period (min)			15									
d Defacto Left Lane. Recode with 1 though lane as a left lane.												
c Critical Lane Group												

F-26

2030 Future Conditions - Scenario 3 (w/ impr.)
5: Mass Ave. & Driveway 1

AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↑↑↑		↑↑			
Sign Control	Free		Free		Stop	
Grade	0%		0%		0%	
Volume (veh/h)	92	1845	1671	115	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	100	2005	1816	125	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type						
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked	0.45				0.45	0.45
vC, conflicting volume	1941				2747	971
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1870				3660	0
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	30				100	100
cM capacity (veh/h)	143				0	488
Direction, Lane #						
	EB 1	EB 2	EB 3	WB 1	WB 2	
Volume Total	501	802	802	1211	730	
Volume Left	100	0	0	0	0	
Volume Right	0	0	0	0	125	
cSH	143	1700	1700	1700	1700	
Volume to Capacity	0.70	0.47	0.47	0.71	0.43	
Queue Length 95th (ft)	100	0	0	0	0	
Control Delay (s)	68.9	0.0	0.0	0.0	0.0	
Lane LOS	F					
Approach Delay (s)	16.4		0.0			
Approach LOS						
Intersection Summary						
Average Delay			8.5			
Intersection Capacity Utilization			103.7%		ICU Level of Service	G
Analysis Period (min)			15			

2030 Future Conditions - Scenario 3 (w/ impr.)
6: Mass Ave. & Driveway 2

AM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations	↑↑↑		↑↑				
Sign Control	Free		Free		Stop		
Grade	0%		0%		0%		
Volume (veh/h)	0	1846	1671	0	91	60	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	0	2007	1816	0	99	65	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type							
Median storage (veh)							
Upstream signal (ft)							
pX, platoon unblocked	0.47				0.47	0.47	
vC, conflicting volume	1816				2485	908	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1608				3036	0	
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				0	87	
cM capacity (veh/h)	188				5	508	
Direction, Lane #							
	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	669	669	669	908	908	99	65
Volume Left	0	0	0	0	0	99	0
Volume Right	0	0	0	0	0	0	65
cSH	1700	1700	1700	1700	1700	5	508
Volume to Capacity	0.39	0.39	0.39	0.53	0.53	21.13	0.13
Queue Length 95th (ft)	0	0	0	0	0	Err	11
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	Err	13.1
Lane LOS						F	B
Approach Delay (s)	0.0		0.0		6031.1		
Approach LOS						F	
Intersection Summary							
Average Delay			248.3				
Intersection Capacity Utilization			63.6%		ICU Level of Service		B
Analysis Period (min)			15				

4-27

2030 Future Conditions - Scenario 3 (w/ impr.)
9: M St. & 9th St

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕		↘		↗		↕		↖		↗	
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		0.95		0.95		1.00	
Fit	0.93		1.00		0.85		0.98		1.00		1.00	
Fit Protected	0.99		0.95		1.00		1.00		1.00		1.00	
Satd. Flow (prot)	1717		1770		1583		3474		3533		1900	
Fit Permitted	0.99		0.95		1.00		1.00		0.94		1.00	
Satd. Flow (perm)	1717		1770		1583		3474		3311		1900	
Volume (vph)	25	49	81	93	0	20	0	105	15	57	1462	0
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)	27	53	88	101	0	22	0	114	16	62	1589	0
RTOR Reduction (vph)	0	8	0	0	0	0	0	8	0	0	0	0
Lane Group Flow (vph)	0	160	0	101	0	22	0	122	0	0	1651	0
Turn Type	Perm		Prot		custom		Perm		Perm		Perm	
Protected Phases	6!		2!		2		4		8		8	
Permitted Phases	6		Free		8		8		8		8	
Actuated Green, G (s)	41.0		41.0		100.0		49.0		49.0		49.0	
Effective Green, g (s)	42.0		42.0		100.0		50.0		50.0		50.0	
Actuated g/C Ratio	0.42		0.42		1.00		0.50		0.50		0.50	
Clearance Time (s)	5.0		5.0		5.0		5.0		5.0		5.0	
Lane Grp Cap (vph)	721		743		1583		1737		1656		1900	
v/s Ratio Prot	0.09		0.06		0.01		0.04		c0.50		1.00	
v/s Ratio Perm	0.22		0.14		0.01		0.07		1.00		1.00	
v/c Ratio	18.5		17.8		0.0		13.0		24.9		24.9	
Uniform Delay, d1	1.41		1.00		1.00		0.42		1.00		1.00	
Progression Factor	0.7		0.4		0.0		0.1		21.4		21.4	
Incremental Delay, d2	26.8		18.2		0.0		5.5		46.3		46.3	
Delay (s)	C		B		A		A		D		D	
Level of Service	26.8		15.0		5.5		46.3		46.3		46.3	
Approach Delay (s)	C		B		A		D		D		D	
Approach LOS	C		B		A		D		D		D	
Intersection Summary												
HCM Average Control Delay	40.3		HCM Level of Service		D		D		D		D	
HCM Volume to Capacity ratio	0.64		Sum of lost time (s)		8.0		8.0		8.0		8.0	
Actuated Cycle Length (s)	100.0		ICU Level of Service		C		C		C		C	
Intersection Capacity Utilization	69.5%		Analysis Period (min)		15		15		15		15	
Analysis Period (min)	15		15		15		15		15		15	
! Phase conflict between lane groups.												
c Critical Lane Group												

F-28

2030 Future Conditions - Scenario 3 (w/ impr.)
10: M St. & 10th St

AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕		↘		↗		↕		↖		↗	
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		0.99		0.99		1.00	
Fit	0.96		1.00		1.00		0.99		1.00		1.00	
Fit Protected	1.00		0.98		1.00		1.00		1.00		1.00	
Satd. Flow (prot)	1788		1829		1840		1840		1840		1840	
Fit Permitted	1.00		0.94		0.99		0.99		0.99		0.99	
Satd. Flow (perm)	1788		1744		1840		1840		1840		1840	
Volume (vph)	0	131	55	4	6	0	0	0	0	21	177	11
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	142	60	4	7	0	0	0	0	23	192	12
RTOR Reduction (vph)	0	15	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	187	0	0	11	0	0	0	0	0	225	0
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	6		2		2		8		8		8	
Permitted Phases	2		8		8		8		8		8	
Actuated Green, G (s)	45.0		45.0		44.0		44.0		44.0		44.0	
Effective Green, g (s)	47.0		47.0		45.0		45.0		45.0		45.0	
Actuated g/C Ratio	0.47		0.47		0.45		0.45		0.45		0.45	
Clearance Time (s)	6.0		6.0		5.0		5.0		5.0		5.0	
Lane Grp Cap (vph)	840		820		828		828		828		828	
v/s Ratio Prot	c0.10		0.01		0.12		0.12		0.12		0.12	
v/s Ratio Perm	0.22		0.01		0.27		0.27		0.27		0.27	
v/c Ratio	15.7		14.1		17.2		17.2		17.2		17.2	
Uniform Delay, d1	1.00		1.00		1.00		1.00		1.00		1.00	
Progression Factor	0.6		0.0		0.8		0.8		0.8		0.8	
Incremental Delay, d2	16.3		14.2		18.0		18.0		18.0		18.0	
Delay (s)	B		B		B		B		B		B	
Level of Service	16.3		14.2		0.0		18.0		18.0		18.0	
Approach Delay (s)	B		B		A		B		B		B	
Approach LOS	B		B		A		B		B		B	
Intersection Summary												
HCM Average Control Delay	17.1		HCM Level of Service		B		B		B		B	
HCM Volume to Capacity ratio	0.25		Sum of lost time (s)		8.0		8.0		8.0		8.0	
Actuated Cycle Length (s)	100.0		ICU Level of Service		A		A		A		A	
Intersection Capacity Utilization	28.1%		Analysis Period (min)		15		15		15		15	
Analysis Period (min)	15		15		15		15		15		15	
c Critical Lane Group												

2030 Future Conditions - Scenario 3
1: L St & 9th St

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔		↔	↔		↔	↔	
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	
Lane Util. Factor		0.95			0.95			0.95			0.95	
Frb, ped/bikes		1.00			0.99			0.99			1.00	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		1.00			0.97			0.98			0.99	
Flt Protected		1.00			0.99			1.00			1.00	
Satd. Flow (prot)		3157			2852			3084			3126	
Flt Permitted		0.88			0.82			0.72			0.93	
Satd. Flow (perm)		2797			2365			2227			2901	
Volume (vph)	27	239	5	81	255	100	12	188	37	56	1313	121
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)	29	260	5	88	277	109	13	204	40	61	1427	132
RTOR Reduction (vph)	0	1	0	0	28	0	0	15	0	0	7	0
Lane Group Flow (vph)	0	293	0	0	446	0	0	242	0	0	1613	0
Confl. Peds. (#/hr)	25		31	31		25	60		46	46		60
Parking (#/hr)				2	2							
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		6			2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)		47.0			47.0			41.0			41.0	
Effective Green, g (s)		49.0			49.0			43.0			43.0	
Actuated g/C Ratio		0.49			0.49			0.43			0.43	
Clearance Time (s)		6.0			6.0			6.0			6.0	
Lane Grp Cap (vph)		1371			1159			958			1247	
v/s Ratio Prot												
v/s Ratio Perm		0.10			c0.19			0.11			c0.56	
v/c Ratio		0.21			0.38			0.25			1.29	
Uniform Delay, d1		14.5			16.0			18.2			28.5	
Progression Factor		1.04			1.00			1.85			0.95	
Incremental Delay, d2		0.3			1.0			0.4			138.2	
Delay (s)		15.5			17.0			34.1			165.3	
Level of Service		B			B			C			F	
Approach Delay (s)		15.5			17.0			34.1			165.3	
Approach LOS		B			B			C			F	
Intersection Summary												
HCM Average Control Delay		109.3										F
HCM Volume to Capacity ratio		0.81										
Actuated Cycle Length (s)		100.0						8.0				
Intersection Capacity Utilization		174.3%										H
Analysis Period (min)		15										

2030 Future Conditions - Scenario 3
2: L St & 10th St

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔		↔	↔		↔	↔		↔	↔	
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				0.91	0.91		1.00		1.00		1.00	
Frb, ped/bikes				1.00	1.00		1.00		0.96		0.98	
Flpb, ped/bikes				0.96	1.00		0.96		1.00		1.00	
Frt				1.00	1.00		1.00		0.85		0.96	
Flt Protected				0.95	1.00		0.95		1.00		1.00	
Satd. Flow (prot)				1386	3037		1522		1374		1401	
Flt Permitted				0.95	1.00		0.63		1.00		1.00	
Satd. Flow (perm)				1386	3037		1014		1374		1401	
Volume (vph)	0	0	0	132	249	0	90	0	273	0	105	46
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	0	0	143	271	0	98	0	297	0	114	50
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	160	0	16	0
Lane Group Flow (vph)	0	0	0	129	285	0	98	0	137	0	148	0
Confl. Peds. (#/hr)	71		67	67		71	87		37	37		87
Parking (#/hr)												2
Turn Type				Perm			custom		custom		Perm	
Protected Phases					2							8
Permitted Phases				2			4		4		8	
Actuated Green, G (s)					45.0	45.0	45.0		45.0		45.0	
Effective Green, g (s)					46.0	46.0	46.0		46.0		46.0	
Actuated g/C Ratio					0.46	0.46	0.46		0.46		0.46	
Clearance Time (s)					5.0	5.0	5.0		5.0		5.0	
Lane Grp Cap (vph)					638	1397	466		632		644	
v/s Ratio Prot												c0.11
v/s Ratio Perm					0.09	0.09	0.10		0.10			
v/c Ratio					0.20	0.20	0.21		0.22		0.23	
Uniform Delay, d1					16.1	16.1	16.1		16.2		16.3	
Progression Factor					0.70	0.70	1.21		2.15		1.49	
Incremental Delay, d2					0.5	0.2	0.1		0.1		0.8	
Delay (s)					11.7	11.5	19.6		34.8		25.0	
Level of Service					B	B	B		C		C	
Approach Delay (s)				0.0		11.6		31.1			25.0	
Approach LOS				A		B		C			C	
Intersection Summary												
HCM Average Control Delay					21.8							C
HCM Volume to Capacity ratio					0.22							
Actuated Cycle Length (s)					100.0				8.0			
Intersection Capacity Utilization					50.0%							A
Analysis Period (min)					15							

F-29

2030 Future Conditions - Scenario 3
3: Mass Ave. & 9th St

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕⇕	⇕		⇕⇕						⇕⇕⇕	
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	
Lane Util. Factor		0.95	1.00		0.95						0.91	
Frb, ped/bikes		1.00	0.68		0.94						0.97	
Flpb, ped/bikes		1.00	1.00		1.00						0.99	
Frt		1.00	0.85		0.97						0.99	
Flt Protected		1.00	1.00		1.00						1.00	
Satd. Flow (prot)		3185	975		2910						4375	
Flt Permitted		1.00	1.00		0.95						1.00	
Satd. Flow (perm)		3185	975		2777						4375	
Volume (vph)	0	1682	934	1	1016	238	0	0	0	54	1256	98
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	1828	1015	1	1104	259	0	0	0	59	1365	107
RTOR Reduction (vph)	0	0	0	0	20	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	1828	1015	0	1344	0	0	0	0	0	1527	0
Confl. Peds. (#/hr)	744	433	433		744	512				127	127	512
Turn Type		Perm	Perm		Perm					Perm		
Protected Phases		6			2						8	
Permitted Phases			6	2	2					8		
Actuated Green, G (s)		68.0	68.0		66.0						24.0	
Effective Green, g (s)		66.0	66.0		66.0						26.0	
Actuated g/C Ratio		0.66	0.66		0.66						0.26	
Clearance Time (s)		2.0	2.0		4.0						6.0	
Lane Grp Cap (vph)		2102	644		1833						1138	
v/s Ratio Prot		0.57										
v/s Ratio Perm			c1.04		0.48						0.35	
v/c Ratio		0.87	1.58		0.73						1.34	
Uniform Delay, d1		13.6	17.0		11.2						37.0	
Progression Factor		0.74	0.76		1.00						1.26	
Incremental Delay, d2		0.5	259.9		2.6						154.5	
Delay (s)		10.6	272.9		13.8						201.2	
Level of Service		B	F		B						F	
Approach Delay (s)		104.2			13.8		0.0				201.2	
Approach LOS		F			B		A				F	
Intersection Summary												
HCM Average Control Delay		108.6			HCM Level of Service		F					
HCM Volume to Capacity ratio		1.51										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)		8.0					
Intersection Capacity Utilization		170.1%			ICU Level of Service		H					
Analysis Period (min)		15										
c Critical Lane Group												

F-30

2030 Future Conditions - Scenario 3
4: Mass Ave. & 10th St

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕⇕⇕			⇕⇕						⇕⇕	
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	
Lane Util. Factor		0.91			0.95						0.95	
Frb, ped/bikes		1.00			0.99						1.00	
Flpb, ped/bikes		1.00			1.00						0.97	
Frt		0.99			0.99						0.99	
Flt Protected		1.00			0.99						0.98	
Satd. Flow (prot)		4507			3108						2996	
Flt Permitted		0.68			0.49						0.98	
Satd. Flow (perm)		3095			1522						2996	
Volume (vph)	273	2511	146	150	849	90	0	0	0	72	97	6
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)	297	2729	159	163	923	98	0	0	0	78	105	7
RTOR Reduction (vph)	0	1	0	0	7	0	0	0	0	0	3	0
Lane Group Flow (vph)	0	3184	0	0	1177	0	0	0	0	0	187	0
Confl. Peds. (#/hr)	96	64	64		96	93				84	84	93
Turn Type		Perm			Perm						Perm	
Protected Phases		6			2						8	
Permitted Phases			6		2						8	
Actuated Green, G (s)		83.0			83.0						7.0	
Effective Green, g (s)		84.0			84.0						8.0	
Actuated g/C Ratio		0.84			0.84						0.08	
Clearance Time (s)		5.0			5.0						5.0	
Lane Grp Cap (vph)		2600			1278						240	
v/s Ratio Prot												
v/s Ratio Perm			c1.03		0.77						0.06	
v/c Ratio		1.22			2.20d						0.78	
Uniform Delay, d1		8.0			5.7						45.1	
Progression Factor		1.00			1.60						1.00	
Incremental Delay, d2		104.8			8.7						21.6	
Delay (s)		112.8			17.8						66.6	
Level of Service		F			B						E	
Approach Delay (s)		112.8			17.8		0.0				66.6	
Approach LOS		F			B		A				E	
Intersection Summary												
HCM Average Control Delay		86.2			HCM Level of Service		F					
HCM Volume to Capacity ratio		1.19										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)		8.0					
Intersection Capacity Utilization		148.9%			ICU Level of Service		H					
Analysis Period (min)		15										
d1 Defacto Left Lane. Recode with 1 though lane as a left lane.												
c Critical Lane Group												

2030 Future Conditions - Scenario 3

PM Peak Hour

5: Mass Ave. & Driveway #1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑			
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	82	2615	1013	101	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	89	2842	1101	110	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type						
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked	0.74				0.75	0.74
vC, conflicting volume	1211				2282	605
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	933				823	115
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	83				100	100
cM capacity (veh/h)	539				195	677
Direction, Lane #						
Volume Total	658	1137	1137	734	477	
Volume Left	89	0	0	0	0	
Volume Right	0	0	0	0	110	
cSH	539	1700	1700	1700	1700	
Volume to Capacity	0.17	0.67	0.67	0.43	0.28	
Queue Length 95th (ft)	15	0	0	0	0	
Control Delay (s)	4.5	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	1.0			0.0		
Approach LOS						
Intersection Summary						
Average Delay			0.7			
Intersection Capacity Utilization			99.3%		ICU Level of Service	F
Analysis Period (min)			15			

2030 Future Conditions - Scenario 3

PM Peak Hour

6: Mass Ave. & Driveway #2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑		↑	↑
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	2582	1013	0	115	76
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2807	1101	0	125	83
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type						
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked	0.79				0.72	0.79
vC, conflicting volume	1101				2037	551
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	860				643	161
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				57	88
cM capacity (veh/h)	613				294	674
Direction, Lane #						
Volume Total	936	936	936	551	551	125
Volume Left	0	0	0	0	0	125
Volume Right	0	0	0	0	0	0
cSH	1700	1700	1700	1700	1700	294
Volume to Capacity	0.55	0.55	0.55	0.32	0.32	0.43
Queue Length 95th (ft)	0	0	0	0	0	51
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	26.0
Lane LOS						D
Approach Delay (s)	0.0			0.0		20.1
Approach LOS						C
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization			69.2%		ICU Level of Service	C
Analysis Period (min)			15			

F-31

2030 Future Conditions - Scenario 3
9: M St. & 9th St

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕		⇕		⇕		⇕		⇕		⇕
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		0.95		0.95		0.95
Frt		0.96		1.00		0.85		0.99		1.00		1.00
Fit Protected		0.99		0.95		1.00		1.00		0.99		0.99
Satd. Flow (prot)		1765		1770		1583		3497		3510		3510
Fit Permitted		0.99		0.53		1.00		1.00		0.83		0.83
Satd. Flow (perm)		1765		985		1583		3497		2931		2931
Volume (vph)	55	121	81	73	0	69	0	290	25	68	336	0
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)	60	132	88	79	0	75	0	315	27	74	365	0
RTOR Reduction (vph)	0	16	0	0	0	0	0	7	0	0	0	0
Lane Group Flow (vph)	0	264	0	79	0	75	0	336	0	0	439	0
Turn Type	Perm		custom		Free		Perm					
Protected Phases	6						4				8	
Permitted Phases	6		2		Free				8			
Actuated Green, G (s)	41.0		41.0		100.0		50.0				50.0	
Effective Green, g (s)	42.0		42.0		100.0		50.0				50.0	
Actuated g/C Ratio	0.42		0.42		1.00		0.50				0.50	
Clearance Time (s)	5.0		5.0		4.0		4.0				4.0	
Lane Grp Cap (vph)	741		414		1583		1749				1466	
v/s Ratio Prot					0.10		0.10					
v/s Ratio Perm	0.15		0.08		0.05		0.19				c0.15	
v/c Ratio	0.36		0.19		0.05		0.19				0.30	
Uniform Delay, d1	19.8		18.3		0.0		13.8				14.7	
Progression Factor	1.82		1.00		1.00		1.01				1.00	
Incremental Delay, d2	1.3		1.0		0.1		0.2				0.5	
Delay (s)	37.2		19.3		0.1		14.2				15.2	
Level of Service	D		B		A		B				B	
Approach Delay (s)	37.2				9.9		14.2				15.2	
Approach LOS	D				A		B				B	
Intersection Summary												
HCM Average Control Delay	19.3		HCM Level of Service		B							
HCM Volume to Capacity ratio	0.33											
Actuated Cycle Length (s)	100.0		Sum of lost time (s)		8.0							
Intersection Capacity Utilization	51.1%		ICU Level of Service		A							
Analysis Period (min)	15											
c Critical Lane Group												

F-3

2030 Future Conditions - Scenario 3
10: M St. & 10th St

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕		⇕		⇕		⇕		⇕		⇕
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
Frt		0.98		1.00		1.00		1.00		0.98		0.98
Fit Protected		1.00		0.98		0.98		0.98		0.99		0.99
Satd. Flow (prot)		1825		1817		1817		1817		1814		1814
Fit Permitted		1.00		0.93		0.93		0.93		0.99		0.99
Satd. Flow (perm)		1825		1734		1734		1734		1814		1814
Volume (vph)	0	272	49	1	1	0	0	0	0	0	31	96
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	296	53	1	1	0	0	0	0	0	34	104
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	0	5
Lane Group Flow (vph)	0	343	0	0	2	0	0	0	0	0	0	151
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	6		2		2		2		2		8	
Permitted Phases	2		2		2		2		2		8	
Actuated Green, G (s)	45.0		45.0		45.0		45.0		45.0		44.0	
Effective Green, g (s)	47.0		47.0		47.0		47.0		47.0		45.0	
Actuated g/C Ratio	0.47		0.47		0.47		0.47		0.47		0.45	
Clearance Time (s)	6.0		6.0		6.0		6.0		6.0		5.0	
Lane Grp Cap (vph)	858		815		815		815		815		816	
v/s Ratio Prot	c0.19											
v/s Ratio Perm	0.40		0.00		0.00		0.00		0.00		0.08	
v/c Ratio	0.40		0.00		0.00		0.00		0.00		0.19	
Uniform Delay, d1	17.3		14.1		14.1		14.1		14.1		16.5	
Progression Factor	1.00		1.00		1.00		1.00		1.00		1.00	
Incremental Delay, d2	1.4		0.0		0.0		0.0		0.0		0.5	
Delay (s)	18.7		14.1		14.1		14.1		14.1		17.0	
Level of Service	B		B		B		B		B		B	
Approach Delay (s)	18.7		14.1		14.1		14.1		0.0		17.0	
Approach LOS	B		B		B		B		A		B	
Intersection Summary												
HCM Average Control Delay	18.1		HCM Level of Service		B							
HCM Volume to Capacity ratio	0.29											
Actuated Cycle Length (s)	100.0		Sum of lost time (s)		8.0							
Intersection Capacity Utilization	31.8%		ICU Level of Service		A							
Analysis Period (min)	15											
c Critical Lane Group												

2030 Future Conditions - Scenario 3 (w/ impr.)
1: L St & 9th St

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
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		
Lane Util. Factor	0.95			0.95			0.95			0.95		
Frbp, ped/bikes	1.00			0.99			0.99			1.00		
Flpb, ped/bikes	1.00			1.00			1.00			1.00		
Frt	1.00			0.97			0.98			0.99		
Flt Protected	1.00			0.99			1.00			1.00		
Satd. Flow (prot)	3156			2845			3084			3126		
Flt Permitted	0.88			0.82			0.84			0.93		
Satd. Flow (perm)	2784			2349			2587			2903		
Volume (vph)	27	239	5	81	255	100	12	188	37	56	1313	121
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)	29	260	5	88	277	109	13	204	40	61	1427	132
RTOR Reduction (vph)	0	1	0	0	28	0	0	15	0	0	7	0
Lane Group Flow (vph)	0	293	0	0	446	0	0	242	0	0	1613	0
Confl. Peds. (#/hr)	25		31	31	25		60		46	46		60
Parking (#/hr)			2		2							
Turn Type	Perm		Perm		Perm		Perm		Perm			
Protected Phases	6		2		4		8				8	
Permitted Phases	6		2		4		8				8	
Actuated Green, G (s)	34.0		34.0		54.0		54.0				54.0	
Effective Green, g (s)	36.0		36.0		56.0		56.0				56.0	
Actuated g/C Ratio	0.36		0.36		0.56		0.56				0.56	
Clearance Time (s)	6.0		6.0		6.0		6.0				6.0	
Lane Grp Cap (vph)	1002		846		1449		1626					
v/s Ratio Prot											c0.11	
v/s Ratio Perm	0.11		c0.19		0.09		c0.56					
v/c Ratio	0.29		0.53		0.17		0.99					
Uniform Delay, d1	22.9		25.3		10.7		21.8					
Progression Factor	0.92		1.00		0.63		0.88					
Incremental Delay, d2	0.7		2.3		0.2		20.5					
Delay (s)	21.7		27.6		6.9		39.7					
Level of Service	C		C		A		D					
Approach Delay (s)	21.7		27.6		6.9		39.7					
Approach LOS	C		C		A		D					
Intersection Summary												
HCM Average Control Delay	32.4		HCM Level of Service		C							
HCM Volume to Capacity ratio	0.81											
Actuated Cycle Length (s)	100.0		Sum of lost time (s)		8.0							
Intersection Capacity Utilization	151.0%		ICU Level of Service		H							
Analysis Period (min)	15											
c Critical Lane Group												

2030 Future Conditions - Scenario 3 (w/ impr.)
2: L St & 10th St

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔			↔			↔			↔		
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		
Lane Util. Factor	0.91			0.91			1.00			1.00		
Frbp, ped/bikes	1.00			1.00			1.00			0.96		0.98
Flpb, ped/bikes	0.96			1.00			0.96			1.00		1.00
Frt	1.00			1.00			1.00			0.85		0.96
Flt Protected	0.95			1.00			0.95			1.00		1.00
Satd. Flow (prot)	1386			3037			1522			1374		1401
Flt Permitted	0.95			1.00			0.63			1.00		1.00
Satd. Flow (perm)	1386			3037			1014			1374		1401
Volume (vph)	0	0	0	132	249	0	90	0	273	0	105	46
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	0	0	143	271	0	98	0	297	0	114	50
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	160	0	16	0
Lane Group Flow (vph)	0	0	0	129	285	0	98	0	137	0	148	0
Confl. Peds. (#/hr)	71		67		67		71		87		37	
Parking (#/hr)											2	
Turn Type	Perm		custom		custom		Perm		Perm			
Protected Phases	2		2		2		8				8	
Permitted Phases	2		4		4		8				8	
Actuated Green, G (s)	45.0		45.0		45.0		45.0				45.0	
Effective Green, g (s)	46.0		46.0		46.0		46.0				46.0	
Actuated g/C Ratio	0.46		0.46		0.46		0.46				0.46	
Clearance Time (s)	5.0		5.0		5.0		5.0				5.0	
Lane Grp Cap (vph)	638		1397		466		632				644	
v/s Ratio Prot											c0.11	
v/s Ratio Perm	0.09		0.09		0.10		0.10					
v/c Ratio	0.20		0.20		0.21		0.22				0.23	
Uniform Delay, d1	16.1		16.1		16.1		16.2				16.3	
Progression Factor	0.64		0.64		1.07		1.40				1.49	
Incremental Delay, d2	0.5		0.2		0.4		0.3				0.8	
Delay (s)	10.8		10.6		17.6		22.9				25.0	
Level of Service	B		B		B		C				C	
Approach Delay (s)	0.0		10.6		21.6		25.0					
Approach LOS	A		B		C		C					
Intersection Summary												
HCM Average Control Delay	17.5		HCM Level of Service		B							
HCM Volume to Capacity ratio	0.22											
Actuated Cycle Length (s)	100.0		Sum of lost time (s)		8.0							
Intersection Capacity Utilization	50.0%		ICU Level of Service		A							
Analysis Period (min)	15											
c Critical Lane Group												

F-33

2030 Future Conditions - Scenario 3 (w/ impr.)

PM Peak Hour

3: Mass Ave. & 9th St

	↖	→	↘	↙	←	↖	↙	↘	↙	↖	↘	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑					↑↑↑		
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	
Lane Util. Factor		0.95	1.00		0.95						0.91	
Frbp, ped/bikes		1.00	0.68		0.94						0.97	
Flpb, ped/bikes		1.00	1.00		1.00						0.99	
Frt		1.00	0.85		0.97						0.99	
Flt Protected		1.00	1.00		1.00						1.00	
Satd. Flow (prot)		3185	975		2910						4375	
Flt Permitted		1.00	1.00		0.95						1.00	
Satd. Flow (perm)		3185	975		2777						4375	
Volume (vph)	0	1682	934	1	1016	238	0	0	0	54	1256	98
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	1828	1015	1	1104	259	0	0	0	59	1365	107
RTOR Reduction (vph)	0	0	0	0	20	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	1828	1015	0	1344	0	0	0	0	0	1527	0
Confl. Peds. (#/hr)	744	433	433		744	512			127	127		512
Turn Type		Perm	Perm						Perm			
Protected Phases		6			2							8
Permitted Phases			6	2	2					8		
Actuated Green, G (s)		68.0	68.0		66.0						24.0	
Effective Green, g (s)		66.0	66.0		66.0						26.0	
Actuated g/C Ratio		0.66	0.66		0.66						0.26	
Clearance Time (s)		2.0	2.0		4.0						6.0	
Lane Grp Cap (vph)		2102	644		1833						1138	
w/s Ratio Prot		0.57										
w/s Ratio Perm			c1.04		0.48						0.35	
w/c Ratio		0.87	1.58		0.73						1.34	
Uniform Delay, d1		13.6	17.0		11.2						37.0	
Progression Factor		0.50	0.56		1.00						0.56	
Incremental Delay, d2		0.5	259.9		2.6						155.8	
Delay (s)		7.3	269.5		13.8						176.5	
Level of Service		A	F		B						F	
Approach Delay (s)		100.9			13.8			0.0			176.5	
Approach LOS		F			B			A			F	
Intersection Summary												
HCM Average Control Delay		100.4			HCM Level of Service						F	
HCM Volume to Capacity ratio		1.51										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)						8.0	
Intersection Capacity Utilization		170.1%			ICU Level of Service						H	
Analysis Period (min)		15										
c Critical Lane Group												

2030 Future Conditions - Scenario 3 (w/ impr.)

PM Peak Hour

4: Mass Ave. & 10th St

	↖	→	↘	↙	←	↖	↙	↘	↙	↖	↘	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑					↑↑↑		
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	
Lane Util. Factor		1.00	0.95		0.95						0.95	
Frbp, ped/bikes		1.00	1.00		0.99						0.99	
Flpb, ped/bikes		1.00	1.00		1.00						0.90	
Frt		1.00	0.99		0.99						0.99	
Flt Protected		0.95	1.00		0.99						0.98	
Satd. Flow (prot)		1591	3151		3108						2754	
Flt Permitted		0.19	1.00		0.50						0.98	
Satd. Flow (perm)		318	3151		1554						2754	
Volume (vph)	273	2511	146	150	849	90	0	0	0	72	97	6
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)	297	2729	159	163	923	98	0	0	0	78	105	7
RTOR Reduction (vph)	0	4	0	0	7	0	0	0	0	0	3	0
Lane Group Flow (vph)	297	2884	0	0	1177	0	0	0	0	0	187	0
Confl. Peds. (#/hr)	96		64	64		96	93		84	84		93
Turn Type		pm+pt			Perm						Perm	
Protected Phases		1	6								2	8
Permitted Phases			6		2						8	
Actuated Green, G (s)		80.0	80.0		70.0						10.0	
Effective Green, g (s)		81.0	81.0		71.0						11.0	
Actuated g/C Ratio		0.81	0.81		0.71						0.11	
Clearance Time (s)		4.0	5.0		5.0						5.0	
Lane Grp Cap (vph)		334	2552		1103						303	
w/s Ratio Prot		0.05	c0.92									
w/s Ratio Perm			0.67		0.76						0.07	
w/c Ratio		0.89	1.13		2.23dl						0.62	
Uniform Delay, d1		6.8	9.5		14.5						42.5	
Progression Factor		1.00	1.00		0.98						0.91	
Incremental Delay, d2		27.8	64.1		42.5						9.0	
Delay (s)		34.6	73.6		56.7						47.8	
Level of Service		C	E		E						D	
Approach Delay (s)		70.0			56.7			0.0			47.8	
Approach LOS		E			E			A			D	
Intersection Summary												
HCM Average Control Delay		65.6			HCM Level of Service						E	
HCM Volume to Capacity ratio		1.07										
Actuated Cycle Length (s)		100.0			Sum of lost time (s)						8.0	
Intersection Capacity Utilization		152.8%			ICU Level of Service						H	
Analysis Period (min)		15										
dl Defacto Left Lane. Recode with 1 though lane as a left lane.												
c Critical Lane Group												

2030 Future Conditions - Scenario 3 (w/ impr.)
9: M St. & 9th St

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕		↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
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		0.95		0.95		1.00	
Frt	0.96		1.00		0.85		0.99		1.00		0.99	
Flt Protected	0.99		0.95		1.00		1.00		0.99		0.99	
Satd. Flow (prot)	1765		1770		1583		3497		3510		3510	
Flt Permitted	0.99		0.53		1.00		1.00		0.83		0.83	
Satd. Flow (perm)	1765		985		1583		3497		2931		2931	
Volume (vph)	55	121	81	73	0	69	0	290	25	68	336	0
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)	60	132	88	79	0	75	0	315	27	74	365	0
RTOR Reduction (vph)	0	16	0	0	0	0	0	7	0	0	0	0
Lane Group Flow (vph)	0	264	0	79	0	75	0	336	0	0	439	0
Turn Type	Perm		custom		Free		Free		Perm		Perm	
Protected Phases	6						4				8	
Permitted Phases	6		2		Free				8			
Actuated Green, G (s)	41.0		41.0		100.0		50.0		50.0		50.0	
Effective Green, g (s)	42.0		42.0		100.0		50.0		50.0		50.0	
Actuated g/C Ratio	0.42		0.42		1.00		0.50		0.50		0.50	
Clearance Time (s)	5.0		5.0		4.0		4.0		4.0		4.0	
Lane Grp Cap (vph)	741		414		1583		1749		1466		1466	
v/s Ratio Prot	0.15		0.08		0.05		0.10		c0.15		c0.15	
v/c Ratio	0.36		0.19		0.05		0.19		0.30		0.30	
Uniform Delay, d1	19.8		18.3		0.0		13.8		14.7		14.7	
Progression Factor	1.82		1.00		1.00		1.49		1.00		1.00	
Incremental Delay, d2	1.3		1.0		0.1		0.2		0.5		0.5	
Delay (s)	37.2		19.3		0.1		20.8		15.2		15.2	
Level of Service	D		B		A		C		B		B	
Approach Delay (s)	37.2				9.9		20.8		15.2		15.2	
Approach LOS	D				A		C		B		B	

Intersection Summary			
HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.33		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	51.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

2030 Future Conditions - Scenario 3 (w/ impr.)
10: M St. & 10th St

PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↕		↖	↖	↖	↖	↖	↖	↖	↖	↖	↖
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	
Frt	0.98		1.00		0.98		1.00		0.98		0.98	
Flt Protected	1.00		0.98		1.00		1.00		0.99		0.99	
Satd. Flow (prot)	1825		1817		1817		1817		1814		1814	
Flt Permitted	1.00		0.93		0.93		0.93		0.99		0.99	
Satd. Flow (perm)	1825		1734		1734		1734		1814		1814	
Volume (vph)	0	272	49	1	1	0	0	0	0	31	96	17
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	296	53	1	1	0	0	0	0	34	104	18
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	343	0	0	2	0	0	0	0	0	151	0
Turn Type	Perm		Perm		Perm		Perm		Perm		Perm	
Protected Phases	6		2		2		2		8		8	
Permitted Phases	6		2		8		8		8		8	
Actuated Green, G (s)	45.0		45.0		44.0		44.0		44.0		44.0	
Effective Green, g (s)	47.0		47.0		45.0		45.0		45.0		45.0	
Actuated g/C Ratio	0.47		0.47		0.45		0.45		0.45		0.45	
Clearance Time (s)	6.0		6.0		5.0		5.0		5.0		5.0	
Lane Grp Cap (vph)	858		815		816		816		816		816	
v/s Ratio Prot	c0.19		0.00		0.08		0.08		0.08		0.08	
v/c Ratio	0.40		0.00		0.19		0.19		0.19		0.19	
Uniform Delay, d1	17.3		14.1		16.5		16.5		16.5		16.5	
Progression Factor	1.00		1.00		1.00		1.00		1.00		1.00	
Incremental Delay, d2	1.4		0.0		0.5		0.5		0.5		0.5	
Delay (s)	18.7		14.1		17.0		17.0		17.0		17.0	
Level of Service	B		B		B		B		B		B	
Approach Delay (s)	18.7		14.1		0.0		17.0		17.0		17.0	
Approach LOS	B		B		A		B		B		B	

Intersection Summary			
HCM Average Control Delay	18.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.29		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	31.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

F-36

2030 Future Conditions - Scenario 3 (w/ impr.)
5: Mass Ave. & Driveway #1

PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑↑	↑↑			
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	82	2615	1013	101	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	89	2842	1101	110	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage (veh)						
Upstream signal (ft)		350	274			
pX, platoon unblocked	0.74			0.41	0.74	
vC, conflicting volume	1211			2282	605	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	933			0	115	
tC, single (s)	4.1			6.8	6.9	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	83			100	100	
cM capacity (veh/h)	539			353	677	
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	
Volume Total	658	1137	1137	734	477	
Volume Left	89	0	0	0	0	
Volume Right	0	0	0	0	110	
cSH	539	1700	1700	1700	1700	
Volume to Capacity	0.17	0.67	0.67	0.43	0.28	
Queue Length 95th (ft)	15	0	0	0	0	
Control Delay (s)	4.5	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	1.0			0.0		
Approach LOS						
Intersection Summary						
Average Delay	0.7					
Intersection Capacity Utilization	99.3%		ICU Level of Service		F	
Analysis Period (min)	15					

2030 Future Conditions - Scenario 3 (w/ impr.)
6: Mass Ave. & Driveway #2

PM Peak Hour



Movement	EBL	EBT	WBT	WBR	SBL	SBR	
Lane Configurations		↑↑↑	↑↑		↑	↑	
Sign Control		Free	Free		Stop		
Grade		0%	0%		0%		
Volume (veh/h)	0	2582	1013	0	115	76	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	0	2807	1101	0	125	83	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type					None		
Median storage (veh)							
Upstream signal (ft)		236	388				
pX, platoon unblocked	0.79				0.36	0.79	
vC, conflicting volume	1101				2037	551	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	860				0	161	
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				66	88	
cM capacity (veh/h)	613				372	674	
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	936	936	936	551	551	125	83
Volume Left	0	0	0	0	0	125	0
Volume Right	0	0	0	0	0	0	83
cSH	1700	1700	1700	1700	1700	372	674
Volume to Capacity	0.55	0.55	0.55	0.32	0.32	0.34	0.12
Queue Length 95th (ft)	0	0	0	0	0	36	10
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	19.5	11.1
Lane LOS						C	B
Approach Delay (s)	0.0			0.0		16.2	
Approach LOS						C	
Intersection Summary							
Average Delay	0.8						
Intersection Capacity Utilization	69.2%		ICU Level of Service		C		
Analysis Period (min)	15						

F-35