Appendix D

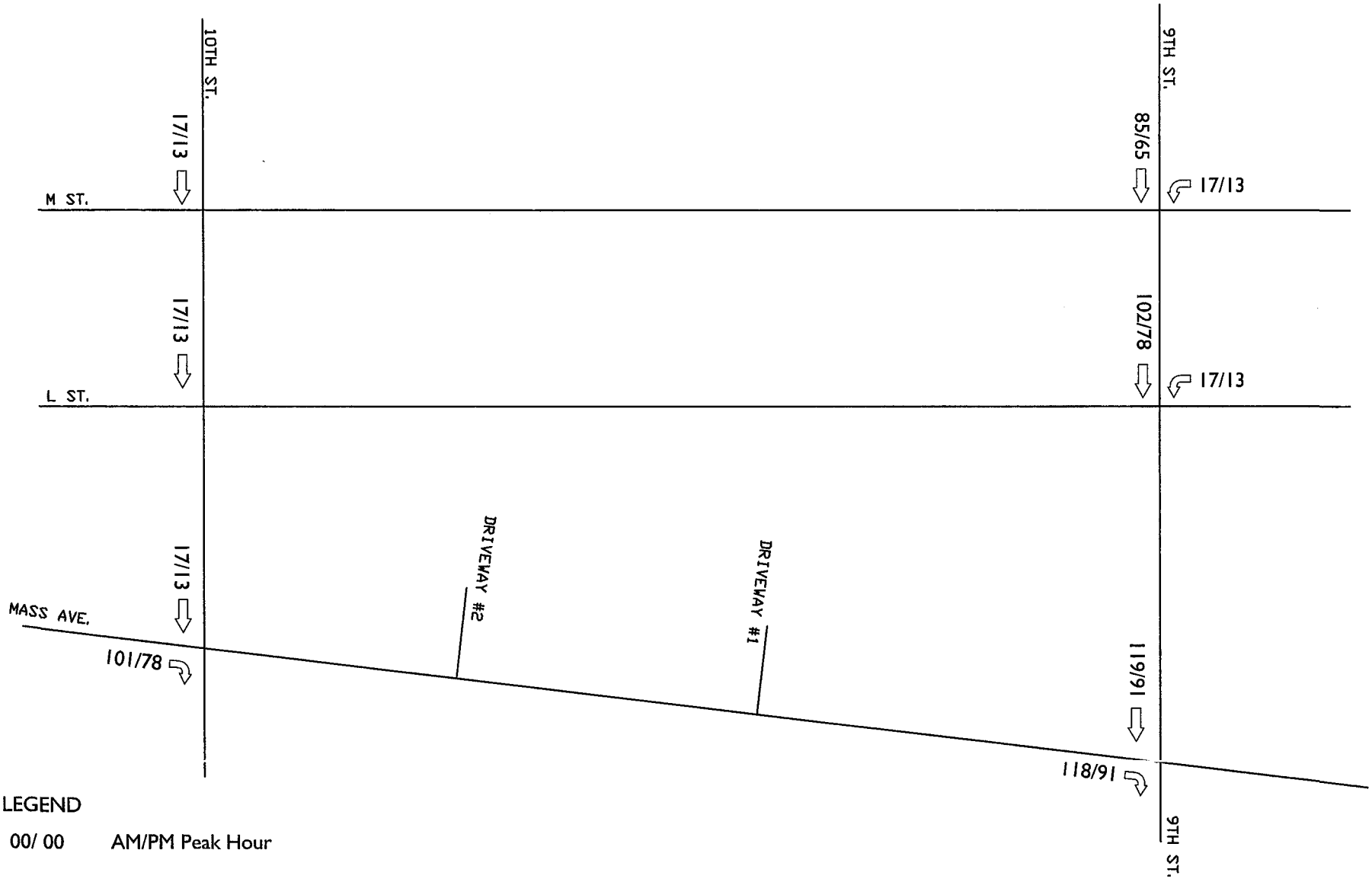
Pipeline Developments

Table D-1
Marriot Marquis, Washington DC
Pipeline Site Development Trip Generation Analysis [1]

Land Use	Land Use Code	Amount	Units	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total
1. Old Convention Center [2]									
Apartments/Condos	220/230	674	D.U.	62	262	324	252	131	383
Transit Reduction [2]	*60%*			*(37)*	*(157)*	*(194)*	*(151)*	*(79)*	*(230)*
				25	105	130	101	52	153
Office	710	462,085	S.F.	561	77	638	101	495	596
Transit Reduction [2]	*50%*			*(281)*	*(39)*	*(319)*	*(51)*	*(248)*	*(298)*
				280	39	319	50	248	298
Retail	820	252,023	S.F.	167	110	273	553	599	1,152
Transit Reduction [2]	*80%*			*(134)*	*(88)*	*(218)*	*(442)*	*(479)*	*(922)*
				33	22	55	111	120	230
Total Trips				**338**	**165**	**503**	**261**	**420**	**681**
2. Office Developments									
901 K Street	710	290,499	S.F.	387	53	440	69	335	404
1099 New York Avenue	710	179,000	S.F.	263	36	299	47	232	279
1050 K Street	710	140,400	S.F.	216	30	246	40	196	236
Transit Reduction [2]	*50%*			*(433)*	*(60)*	*(493)*	*(78)*	*(382)*	*(460)*
Total Trips				**433**	**60**	**493**	**78**	**382**	**460**
3. 9th Street Retail Project									
Retail	820	95,000	S.F.	93	59	152	290	315	605
Transit Reduction [2]	*80%*			*(74)*	*(47)*	*(121)*	*(232)*	*(252)*	*(484)*
Total Trips				**19**	**12**	**31**	**58**	**63**	**121**

Notes:
[1] Trips based on ITE Trip Generation Manual, 7th Edition.
[2] Based Old Convention Center Site - Traffic Impact Analysis for EISF, dated April 4, 2008, prepared by Gorove/Slade.

J-1



LEGEND

00/ 00 AM/PM Peak Hour

RES. AMT	SURV. AMT	COMP. AMT	DES. AMT	DRN. ACAD	CHK. AMT	

ENGINEERS - PLANNERS - SURVEYORS - LANDSCAPE ARCHITECTS

2 EAST READ STREET, BALTIMORE, MD 21202

P(410) 752-6552 F(410) 752-6553

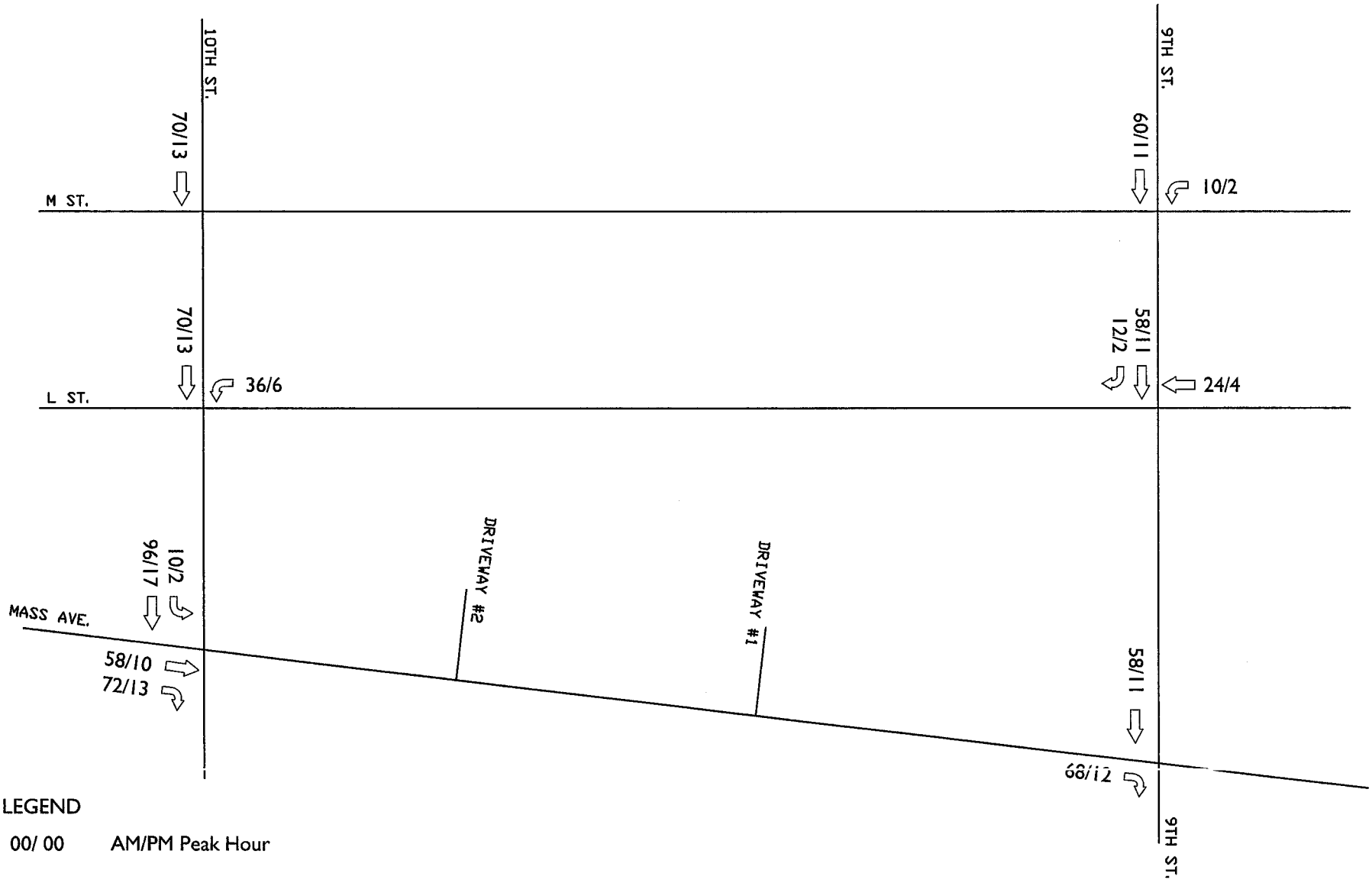
DATE	REVISION	BY	APPR.

MARRIOT MARQUIS - TRAFFIC IMPACT STUDY

FIGURE D-1

OLD CONVENTION CENTER SITE TRIPS

SCALE	CONTOUR INTERVAL	A.M.T. FILE No.
	N/A	108-029.01E
DATE	TAX MAP No.	SHEET
MAY 2008	N/A	



LEGEND

00/ 00 AM/PM Peak Hour

AMT
A. Morton Thomas and Associates, Inc.
Consulting Engineers

ENGINEERS - PLANNERS - SURVEYORS -
LANDSCAPE ARCHITECTS

2 EAST READ STREET, BALTIMORE, MD 21202
P(410) 752-6552 F(410) 752-6553

RES.	SURV.	COMP.	DES.	DRN.	CHK.
AMT	AMT	AMT	AMT	ACAD	AMT

DATE	REVISION	BY	APPR.

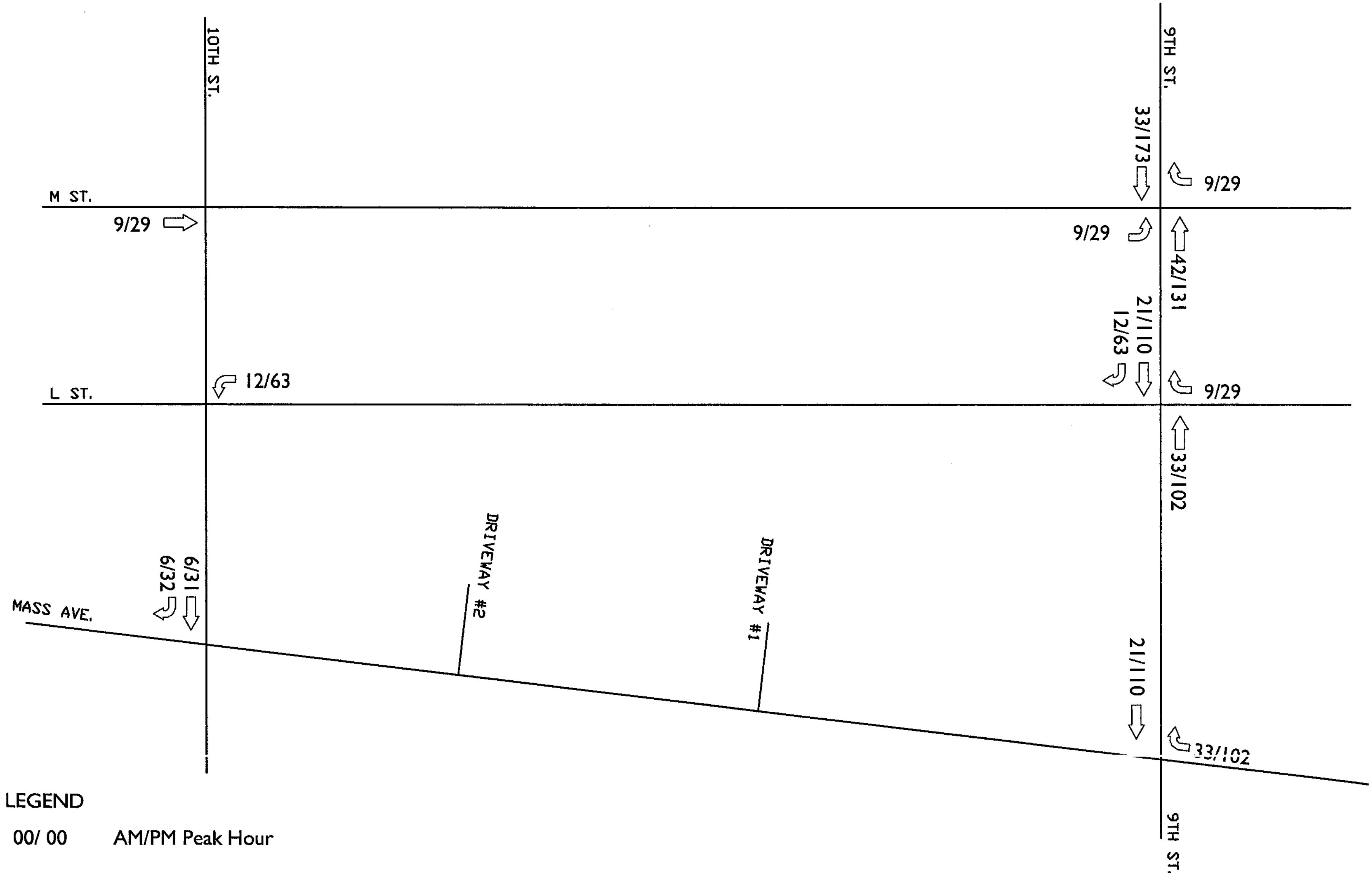
MARRIOT MARQUIS - TRAFFIC IMPACT STUDY

FIGURE D-2

901 K ST, 1099 NY AVE AND 1050 K ST SITE TRIPS

SCALE	CONTOUR INTERVAL	A.M.T. FILE No.
	N/A	108-029.01E
DATE	TAX MAP No.	SHEET
MAY 2008	N/A	

D-2



AMT — ENGINEERS - PLANNERS - SURVEYORS - LANDSCAPE ARCHITECTS

2 EAST READ STREET, BALTIMORE, MD 21202

P(410) 752-6552 F(410) 752-6553

RES.	SURV.	COMP.	DES.	DRN.	CHK.
AMT	AMT	AMT	AMT	ACAD	AMT

DATE	REVISION	BY	APPR.

MARRIOT MARQUIS - TRAFFIC IMPACT STUDY

FIGURE D-3

9TH ST. RETAIL PROJECT SITE TRIPS

SCALE	CONTOUR INTERVAL	A.M.T. FILE No.
	N/A	108-029.01E
DATE	TAX MAP No.	SHEET
MAY 2008	N/A	

D-4

Appendix E

2030 Background Conditions Analyses

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					0.95			0.95			0.95	
Frpb, ped/bikes					0.99			0.99			1.00	
Flpb, ped/bikes					0.99			1.00			1.00	
Frt					0.98			0.99			0.99	
Flt Protected					0.99			0.99			1.00	
Satd. Flow (prot)					2897			3089			3137	
Flt Permitted					0.99			0.76			0.94	
Satd. Flow (perm)					2897			2360			2959	
Volume (vph)	0	0	0	117	440	64	9	39	4	54	1512	75
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	127	478	70	10	42	4	59	1643	82
RTOR Reduction (vph)	0	0	0	0	9	0	0	2	0	0	3	0
Lane Group Flow (vph)	0	0	0	0	666	0	0	54	0	0	1781	0
Confl. Peds. (#/hr)	54		54	54		54	69		135	135		69
Parking (#/hr)				2	2							
Turn Type				Perm			Perm			Perm		
Protected Phases					2			4			8	
Permitted Phases				2			4			8		
Actuated Green, G (s)					39.0			49.0			49.0	
Effective Green, g (s)					41.0			51.0			51.0	
Actuated g/C Ratio					0.41			0.51			0.51	
Clearance Time (s)					6.0			6.0			6.0	
Lane Grp Cap (vph)					1188			1204			1509	
v/s Ratio Prot												
v/s Ratio Perm					0.23			0.02			c0.60	
v/c Ratio					0.56			0.04			1.18	
Uniform Delay, d1					22.6			12.3			24.5	
Progression Factor					1.00			0.82			1.68	
Incremental Delay, d2					1.9			0.0			81.7	
Delay (s)					24.5			10.1			122.7	
Level of Service					C			B			F	
Approach Delay (s)		0.0			24.5			10.1			122.7	
Approach LOS		A			C			B			F	

Intersection Summary				
HCM Average Control Delay	93.9	HCM Level of Service	F	
HCM Volume to Capacity ratio	0.90			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	93.6%	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												
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	0.91						1.00	
Frpb, ped/bikes				1.00	1.00						0.99	
Flpb, ped/bikes				0.92	1.00						1.00	
Frt				1.00	1.00						0.97	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1335	3051						1429	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1335	3051						1429	
Volume (vph)	0	0	0	149	376	0	0	0	0	0	168	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	409	0	0	0	0	0	183	49
RTOR Reduction (vph)	0	0	0	87	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	0	0	75	409	0	0	0	0	0	222	0
Confl. Peds. (#/hr)	103		121	121		103	84		92	92		84
Parking (#/hr)											2	2
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				45.0	45.0						45.0	
Effective Green, g (s)				46.0	46.0						46.0	
Actuated g/C Ratio				0.46	0.46						0.46	
Clearance Time (s)				5.0	5.0						5.0	
Lane Grp Cap (vph)				614	1403						657	
v/s Ratio Prot											c0.16	
v/s Ratio Perm				0.06	0.13							
v/c Ratio				0.12	0.29						0.34	
Uniform Delay, d1				15.4	16.8						17.3	
Progression Factor				0.05	0.52						1.82	
Incremental Delay, d2				0.3	0.4						1.4	
Delay (s)				1.0	9.1						32.7	
Level of Service				A	A						C	
Approach Delay (s)		0.0			6.8			0.0			32.7	
Approach LOS		A			A			A			C	

Intersection Summary				
HCM Average Control Delay	14.3	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.31			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	36.0%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

2030 Background Conditions — AM 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	
Frpb, ped/bikes		1.00	0.93		0.99						0.99	
Flpb, ped/bikes		1.00	1.00		1.00						1.00	
Frt		1.00	0.85		0.99						1.00	
Flt Protected		1.00	1.00		1.00						1.00	
Satd. Flow (prot)		3185	1329		3141						4520	
Flt Permitted		1.00	1.00		0.95						1.00	
Satd. Flow (perm)		3185	1329		2976						4520	
Volume (vph)	0	1013	915	10	1674	75	0	0	0	25	1531	30
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	1101	995	11	1820	82	0	0	0	27	1664	33
RTOR Reduction (vph)	0	0	0	0	3	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	1101	995	0	1910	0	0	0	0	0	1722	0
Confl. Peds. (#/hr)	359		140	140		359	205		134	134		205
Turn Type			custom	custom						Perm		
Protected Phases		5 6	5		2 5						8	
Permitted Phases			6	5	5					8		
Actuated Green, G (s)		69.0	67.0		69.0						21.0	
Effective Green, g (s)		69.0	65.0		69.0						23.0	
Actuated g/C Ratio		0.69	0.65		0.69						0.23	
Clearance Time (s)			4.0								6.0	
Lane Grp Cap (vph)		2198	917		2053						1040	
v/s Ratio Prot		0.35	c0.29									
v/s Ratio Perm			0.46		0.64						0.38	
v/c Ratio		0.50	1.09		0.93						1.66	
Uniform Delay, d1		7.3	17.5		13.4						38.5	
Progression Factor		0.21	0.89		1.00						0.70	
Incremental Delay, d2		0.5	49.7		9.1						295.4	
Delay (s)		2.0	65.3		22.5						322.3	
Level of Service		A	E		C						F	
Approach Delay (s)		32.1			22.5			0.0			322.3	
Approach LOS		C			C			A			F	

Intersection Summary				
HCM Average Control Delay	116.1	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.23			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	171.7%	ICU Level of Service	H	
Analysis Period (min)	15			

c Critical Lane Group

2030 Background Conditions — AM 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	
Lane Util. Factor		0.91			0.95						0.95	
Frpb, ped/bikes		1.00			1.00						1.00	
Flpb, ped/bikes		1.00			1.00						0.99	
Frt		0.99			1.00						1.00	
Flt Protected		1.00			0.99						0.99	
Satd. Flow (prot)		4512			3156						3103	
Flt Permitted		1.00			0.50						0.99	
Satd. Flow (perm)		4512			1601						3103	
Volume (vph)	0	1875	159	307	1364	0	0	0	0	63	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)	0	2038	173	334	1483	0	0	0	0	68	255	7
RTOR Reduction (vph)	0	10	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	2201	0	0	1817	0	0	0	0	0	329	0
Confl. Peds. (#/hr)	116		41	41		116	118		48	48		118
Turn Type				Perm						Perm		
Protected Phases		6			2						8	
Permitted Phases				2						8		
Actuated Green, G (s)		60.0			60.0						30.0	
Effective Green, g (s)		61.0			61.0						31.0	
Actuated g/C Ratio		0.61			0.61						0.31	
Clearance Time (s)		5.0			5.0						5.0	
Lane Grp Cap (vph)		2752			977						962	
v/s Ratio Prot		0.49										
v/s Ratio Perm					c1.14						0.11	
v/c Ratio		0.80			4.91dl						0.34	
Uniform Delay, d1		14.9			19.5						26.6	
Progression Factor		1.00			1.13						0.41	
Incremental Delay, d2		2.5			388.2						0.9	
Delay (s)		17.4			410.2						11.9	
Level of Service		B			F						B	
Approach Delay (s)		17.4			410.2			0.0			11.9	
Approach LOS		B			F			A			B	

Intersection Summary				
HCM Average Control Delay	180.8	HCM Level of Service	F	
HCM Volume to Capacity ratio	1.35			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	136.8%	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

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	1	1929	1697	7	0	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	2097	1845	8	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	1852				2549	926
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1704				694	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 %	99				100	100
cM capacity (veh/h)	184				254	541

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	420	839	839	1230	622	0
Volume Left	1	0	0	0	0	0
Volume Right	0	0	0	0	8	0
cSH	184	1700	1700	1700	1700	1700
Volume to Capacity	0.01	0.49	0.49	0.72	0.37	0.00
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	0.3	0.0	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	55.7%	ICU Level of Service		B
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	9	1930	1670	26	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	2098	1815	28	0	1
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	0.49				0.68	0.49
vC, conflicting volume	1843				2548	922
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1683				658	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 %	95				100	100
cM capacity (veh/h)	186				255	536

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	429	839	839	1210	633	1
Volume Left	10	0	0	0	0	0
Volume Right	0	0	0	0	28	1
cSH	186	1700	1700	1700	1700	536
Volume to Capacity	0.05	0.49	0.49	0.71	0.37	0.00
Queue Length 95th (ft)	4	0	0	0	0	0
Control Delay (s)	2.3	0.0	0.0	0.0	0.0	11.7
Lane LOS	A					B
Approach Delay (s)	0.5			0.0		11.7
Approach LOS						B

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	62.2%	ICU Level of Service		B
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	0	0	20	504	4	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	22	548	4	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	280			305		
pX, platoon unblocked					0.92	
vC, conflicting volume			0		317	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		164	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 %			99		99	100
cM capacity (veh/h)			1622		733	1084

Direction, Lane #	WB 1	WB 2	NB 1
Volume Total	204	365	4
Volume Left	22	0	4
Volume Right	0	0	0
cSH	1622	1700	733
Volume to Capacity	0.01	0.21	0.01
Queue Length 95th (ft)	1	0	0
Control Delay (s)	0.9	0.0	9.9
Lane LOS	A		A
Approach Delay (s)	0.3		9.9
Approach LOS			A

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	26.1%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	0	0	24	52	1586	42
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	26	57	1724	46
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				233	220	
pX, platoon unblocked	0.50	0.50	0.50			
vC, conflicting volume	1827	885	1770			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1656	0	1541			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	88			
cM capacity (veh/h)	39	544	214			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	0	45	38	1149	620
Volume Left	0	26	0	0	0
Volume Right	0	0	0	0	46
cSH	1700	214	1700	1700	1700
Volume to Capacity	0.00	0.12	0.02	0.68	0.36
Queue Length 95th (ft)	0	10	0	0	0
Control Delay (s)	0.0	15.2	0.0	0.0	0.0
Lane LOS	A	C			
Approach Delay (s)	0.0	8.3		0.0	
Approach LOS	A				

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	53.5%	ICU Level of Service		A
Analysis Period (min)	15			

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		1.00		1.00		1.00		0.95			0.95	
Frt		0.93		1.00		0.85		0.98			1.00	
Flt Protected		0.99		0.95		1.00		1.00			1.00	
Satd. Flow (prot)		1717		1770		1583		3463			3533	
Flt Permitted		0.99		0.65		1.00		1.00			0.94	
Satd. Flow (perm)		1717		1203		1583		3463			3314	
Volume (vph)	25	49	81	83	0	20	0	88	15	57	1476	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	90	0	22	0	96	16	62	1604	0
RTOR Reduction (vph)	0	3	0	0	0	0	0	9	0	0	0	0
Lane Group Flow (vph)	0	166	0	90	0	22	0	103	0	0	1666	0
Turn Type	Perm			custom		Free				Perm		
Protected Phases		6						4			8	
Permitted Phases	6			2		Free				8		
Actuated Green, G (s)		50.0		50.0		100.0		41.0			41.0	
Effective Green, g (s)		50.0		50.0		100.0		42.0			42.0	
Actuated g/C Ratio		0.50		0.50		1.00		0.42			0.42	
Clearance Time (s)		4.0		4.0				5.0			5.0	
Lane Grp Cap (vph)		859		602		1583		1454			1392	
v/s Ratio Prot								0.03				
v/s Ratio Perm		0.10		0.07		0.01					c0.50	
v/c Ratio		0.19		0.15		0.01		0.07			1.20	
Uniform Delay, d1		13.8		13.5		0.0		17.3			29.0	
Progression Factor		0.58		1.00		1.00		0.97			1.00	
Incremental Delay, d2		0.5		0.5		0.0		0.1			95.8	
Delay (s)		8.6		14.0		0.0		16.9			124.8	
Level of Service		A		B		A		B			F	
Approach Delay (s)		8.6			11.3			16.9			124.8	
Approach LOS		A			B			B			F	

Intersection Summary				
HCM Average Control Delay	103.3	HCM Level of Service	F	
HCM Volume to Capacity ratio	0.65			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	69.3%	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												
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		1.00			1.00						1.00	
Frt		0.97			1.00						0.99	
Flt Protected		1.00			0.98						0.99	
Satd. Flow (prot)		1798			1829						1838	
Flt Permitted		1.00			0.94						0.99	
Satd. Flow (perm)		1798			1747						1838	
Volume (vph)	0	131	45	4	6	0	0	0	0	24	164	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	49	4	7	0	0	0	0	26	178	12
RTOR Reduction (vph)	0	12	0	0	0	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	179	0	0	11	0	0	0	0	0	214	0
Turn Type				Perm						Perm		
Protected Phases		6			2						8	
Permitted Phases				2						8		
Actuated Green, G (s)		45.0			45.0						44.0	
Effective Green, g (s)		47.0			47.0						45.0	
Actuated g/C Ratio		0.47			0.47						0.45	
Clearance Time (s)		6.0			6.0						5.0	
Lane Grp Cap (vph)		845			821						827	
v/s Ratio Prot		c0.10										
v/s Ratio Perm					0.01						0.12	
v/c Ratio		0.21			0.01						0.26	
Uniform Delay, d1		15.6			14.1						17.1	
Progression Factor		1.00			1.00						1.00	
Incremental Delay, d2		0.6			0.0						0.8	
Delay (s)		16.2			14.2						17.9	
Level of Service		B			B						B	
Approach Delay (s)		16.2			14.2			0.0			17.9	
Approach LOS		B			B			A			B	

Intersection Summary				
HCM Average Control Delay	17.0	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.23			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	26.9%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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					0.95			0.95			0.95	
Frpb, ped/bikes					0.99			0.99			1.00	
Flpb, ped/bikes					1.00			1.00			1.00	
Frt					0.96			0.98			0.99	
Flt Protected					0.99			1.00			1.00	
Satd. Flow (prot)					2848			3065			3148	
Flt Permitted					0.99			0.75			0.93	
Satd. Flow (perm)					2848			2303			2926	
Volume (vph)	0	0	0	72	258	100	12	213	45	54	1512	75
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	78	280	109	13	232	49	59	1643	82
RTOR Reduction (vph)	0	0	0	0	29	0	0	17	0	0	3	0
Lane Group Flow (vph)	0	0	0	0	438	0	0	277	0	0	1781	0
Confl. Peds. (#/hr)	25		31	31		25	60		46	46		60
Parking (#/hr)				2	2							
Turn Type				Perm			Perm			Perm		
Protected Phases					2			4			8	
Permitted Phases				2			4			8		
Actuated Green, G (s)					38.0			50.0			50.0	
Effective Green, g (s)					40.0			52.0			52.0	
Actuated g/C Ratio					0.40			0.52			0.52	
Clearance Time (s)					6.0			6.0			6.0	
Lane Grp Cap (vph)					1139			1198			1522	
v/s Ratio Prot												
v/s Ratio Perm					0.15			0.12			c0.61	
v/c Ratio					0.38			0.23			1.17	
Uniform Delay, d1					21.3			13.1			24.0	
Progression Factor					1.00			1.11			0.47	
Incremental Delay, d2					1.0			0.4			81.2	
Delay (s)					22.3			14.9			92.5	
Level of Service					C			B			F	
Approach Delay (s)		0.0			22.3			14.9			92.5	
Approach LOS		A			C			B			F	

Intersection Summary				
HCM Average Control Delay	70.6	HCM Level of Service	E	
HCM Volume to Capacity ratio	0.83			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	131.5%	ICU Level of Service	H	
Analysis Period (min)	15			

c Critical Lane Group

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	0.91						1.00	
Frpb, ped/bikes				1.00	1.00						0.99	
Flpb, ped/bikes				0.96	1.00						1.00	
Frt				1.00	1.00						0.97	
Flt Protected				0.95	1.00						1.00	
Satd. Flow (prot)				1386	3051						1429	
Flt Permitted				0.95	1.00						1.00	
Satd. Flow (perm)				1386	3051						1429	
Volume (vph)	0	0	0	132	256	0	0	0	0	0	168	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	143	278	0	0	0	0	0	183	49
RTOR Reduction (vph)	0	0	0	77	0	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	0	0	66	278	0	0	0	0	0	222	0
Confl. Peds. (#/hr)	71		67	67		71	87		37	37		87
Parking (#/hr)											2	2
Turn Type				Perm								
Protected Phases					2						8	
Permitted Phases				2								
Actuated Green, G (s)				45.0	45.0						45.0	
Effective Green, g (s)				46.0	46.0						46.0	
Actuated g/C Ratio				0.46	0.46						0.46	
Clearance Time (s)				5.0	5.0						5.0	
Lane Grp Cap (vph)				638	1403						657	
v/s Ratio Prot											c0.16	
v/s Ratio Perm				0.05	0.09							
v/c Ratio				0.10	0.20						0.34	
Uniform Delay, d1				15.3	16.0						17.3	
Progression Factor				0.09	0.64						1.36	
Incremental Delay, d2				0.3	0.3						1.4	
Delay (s)				1.7	10.6						24.9	
Level of Service				A	B						C	
Approach Delay (s)		0.0			7.6			0.0			24.9	
Approach LOS		A			A			A			C	

Intersection Summary				
HCM Average Control Delay	13.7	HCM Level of Service	B	
HCM Volume to Capacity ratio	0.27			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	34.0%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↱		↰↑↑↑						↰↑↑↑	
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	0.82		0.94						0.99	
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	1171		2898						4456	
Flt Permitted		1.00	1.00		1.00						1.00	
Satd. Flow (perm)		3185	1171		2898						4456	
Volume (vph)	0	1877	905	0	962	238	0	0	0	50	1269	50
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	2040	984	0	1046	259	0	0	0	54	1379	54
RTOR Reduction (vph)	0	0	0	0	22	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	2040	984	0	1283	0	0	0	0	0	1483	0
Confl. Peds. (#/hr)	744		433	433		744	512		127	127		512
Turn Type			custom	custom						Perm		
Protected Phases		5 6	5		2 5						8	
Permitted Phases			6	5	5					8		
Actuated Green, G (s)		66.0	64.0		66.0						24.0	
Effective Green, g (s)		66.0	62.0		66.0						26.0	
Actuated g/C Ratio		0.66	0.62		0.66						0.26	
Clearance Time (s)			4.0								6.0	
Lane Grp Cap (vph)		2102	773		1913						1159	
v/s Ratio Prot		0.64	c0.34		0.44							
v/s Ratio Perm			0.50								0.33	
v/c Ratio		0.97	1.27		0.67						1.28	
Uniform Delay, d1		16.1	19.0		10.4						37.0	
Progression Factor		0.62	0.72		1.00						0.90	
Incremental Delay, d2		7.6	127.3		1.9						132.5	
Delay (s)		17.6	141.0		12.3						165.9	
Level of Service		B	F		B						F	
Approach Delay (s)		57.7			12.3			0.0			165.9	
Approach LOS		E			B			A			F	

Intersection Summary				
HCM Average Control Delay	75.2	HCM Level of Service	E	
HCM Volume to Capacity ratio	1.28			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	166.7%	ICU Level of Service	H	
Analysis Period (min)	15			

c Critical Lane Group

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	
Frpb, ped/bikes		1.00			1.00						1.00	
Flpb, ped/bikes		1.00			1.00						0.98	
Frt		0.99			1.00						1.00	
Flt Protected		1.00			0.99						0.99	
Satd. Flow (prot)		4531			3167						3087	
Flt Permitted		1.00			0.49						0.99	
Satd. Flow (perm)		4531			1565						3087	
Volume (vph)	0	2712	146	118	926	0	0	0	0	63	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)	0	2948	159	128	1007	0	0	0	0	68	255	7
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	1	0
Lane Group Flow (vph)	0	3101	0	0	1135	0	0	0	0	0	329	0
Confl. Peds. (#/hr)	96		64	64		96	93		84	84		93
Turn Type				Perm						Perm		
Protected Phases		6			2						8	
Permitted Phases				2						8		
Actuated Green, G (s)		57.0			57.0						33.0	
Effective Green, g (s)		58.0			58.0						34.0	
Actuated g/C Ratio		0.58			0.58						0.34	
Clearance Time (s)		5.0			5.0						5.0	
Lane Grp Cap (vph)		2628			908						1050	
v/s Ratio Prot		0.68										
v/s Ratio Perm					c0.73						0.11	
v/c Ratio		1.18			1.91dl						0.31	
Uniform Delay, d1		21.0			21.0						24.4	
Progression Factor		1.00			0.94						0.54	
Incremental Delay, d2		85.3			120.3						0.8	
Delay (s)		106.3			140.0						14.0	
Level of Service		F			F						B	
Approach Delay (s)		106.3			140.0			0.0			14.0	
Approach LOS		F			F			A			B	

Intersection Summary				
HCM Average Control Delay	108.0	HCM Level of Service	F	
HCM Volume to Capacity ratio	0.90			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	147.1%	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

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	2	2152	812	1	0	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	2339	883	1	0	1
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					0.46	
vC, conflicting volume	884				1667	442
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	884				83	442
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				100	100
cM capacity (veh/h)	761				414	563

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	470	936	936	588	295	1
Volume Left	2	0	0	0	0	0
Volume Right	0	0	0	0	1	1
cSH	761	1700	1700	1700	1700	563
Volume to Capacity	0.00	0.55	0.55	0.35	0.17	0.00
Queue Length 95th (ft)	0	0	0	0	0	0
Control Delay (s)	0.1	0.0	0.0	0.0	0.0	11.4
Lane LOS	A					B
Approach Delay (s)	0.0			0.0		11.4
Approach LOS						B

Intersection Summary				
Average Delay	0.0			
Intersection Capacity Utilization	57.7%	ICU Level of Service		B
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	2770	1012	0	14	32
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	3011	1100	0	15	35
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					0.44	
vC, conflicting volume	1100				2104	550
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1100				940	550
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				87	93
cM capacity (veh/h)	630				114	479

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1
Volume Total	602	1204	1204	733	367	50
Volume Left	0	0	0	0	0	15
Volume Right	0	0	0	0	0	35
cSH	630	1700	1700	1700	1700	243
Volume to Capacity	0.00	0.71	0.71	0.43	0.22	0.21
Queue Length 95th (ft)	0	0	0	0	0	19
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	23.7
Lane LOS						C
Approach Delay (s)	0.0			0.0		23.7
Approach LOS						C

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	69.5%	ICU Level of Service		C
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	0	0	2	379	7	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	2	412	8	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	280			305		
pX, platoon unblocked						
vC, conflicting volume			0		210	0
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			0		210	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		99	100
cM capacity (veh/h)			1622		758	1084

Direction, Lane #	WB 1	WB 2	NB 1
Volume Total	139	275	8
Volume Left	2	0	8
Volume Right	0	0	0
cSH	1622	1700	758
Volume to Capacity	0.00	0.16	0.01
Queue Length 95th (ft)	0	0	1
Control Delay (s)	0.1	0.0	9.8
Lane LOS	A		A
Approach Delay (s)	0.0		9.8
Approach LOS			A

Intersection Summary				
Average Delay	0.2			
Intersection Capacity Utilization	21.7%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Volume (veh/h)	32	21	0	238	347	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	23	0	259	377	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None					
Median storage veh)						
Upstream signal (ft)				233	220	
pX, platoon unblocked						
vC, conflicting volume	507	189	377			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	507	189	377			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	93	97	100			
cM capacity (veh/h)	495	821	1178			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	58	86	172	251	126
Volume Left	35	0	0	0	0
Volume Right	23	0	0	0	0
cSH	588	1178	1700	1700	1700
Volume to Capacity	0.10	0.00	0.10	0.15	0.07
Queue Length 95th (ft)	8	0	0	0	0
Control Delay (s)	11.8	0.0	0.0	0.0	0.0
Lane LOS	B				
Approach Delay (s)	11.8	0.0		0.0	
Approach LOS	B				

Intersection Summary				
Average Delay	1.0			
Intersection Capacity Utilization	20.7%	ICU Level of Service		A
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
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		0.95			0.95	
Frt		0.96		1.00		0.85		0.98			1.00	
Flt Protected		0.99		0.95		1.00		1.00			1.00	
Satd. Flow (prot)		1765		1770		1583		3477			3530	
Flt Permitted		0.99		0.53		1.00		1.00			0.91	
Satd. Flow (perm)		1765		981		1583		3477			3214	
Volume (vph)	55	123	81	64	0	69	0	275	37	68	1308	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	134	88	70	0	75	0	299	40	74	1422	0
RTOR Reduction (vph)	0	13	0	0	0	0	0	11	0	0	0	0
Lane Group Flow (vph)	0	269	0	70	0	75	0	329	0	0	1496	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	
Lane Grp Cap (vph)		741		412		1583		1739			1607	
v/s Ratio Prot								0.09				
v/s Ratio Perm		0.15		0.07		0.05					c0.47	
v/c Ratio		0.36		0.17		0.05		0.19			0.93	
Uniform Delay, d1		19.8		18.1		0.0		13.8			23.4	
Progression Factor		1.79		1.00		1.00		0.53			1.00	
Incremental Delay, d2		1.3		0.9		0.1		0.2			11.1	
Delay (s)		36.8		19.0		0.1		7.6			34.5	
Level of Service		D		B		A		A			C	
Approach Delay (s)		36.8			9.2			7.6			34.5	
Approach LOS		D			A			A			C	

Intersection Summary				
HCM Average Control Delay	29.1	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.67			
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	78.0%	ICU Level of Service	D	
Analysis Period (min)	15			

c Critical Lane Group

F-10

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		1.00			1.00						1.00	
Frt		0.98									0.99	
Flt Protected		1.00									0.99	
Satd. Flow (prot)		1831									1814	
Flt Permitted		1.00									0.99	
Satd. Flow (perm)		1831									1814	
Volume (vph)	0	272	40	0	0	0	0	0	0	35	98	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	43	0	0	0	0	0	0	38	107	18
RTOR Reduction (vph)	0	5	0	0	0	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	334	0	0	0	0	0	0	0	0	159	0
Turn Type				Perm						Perm		
Protected Phases		6			2						8	
Permitted Phases				2						8		
Actuated Green, G (s)		45.0									44.0	
Effective Green, g (s)		47.0									45.0	
Actuated g/C Ratio		0.47									0.45	
Clearance Time (s)		6.0									5.0	
Lane Grp Cap (vph)		861									816	
v/s Ratio Prot		c0.18										
v/s Ratio Perm											0.09	
v/c Ratio		0.39									0.19	
Uniform Delay, d1		17.2									16.6	
Progression Factor		1.00									1.00	
Incremental Delay, d2		1.3									0.5	
Delay (s)		18.5									17.1	
Level of Service		B									B	
Approach Delay (s)		18.5			0.0			0.0			17.1	
Approach LOS		B			A			A			B	

Intersection Summary				
HCM Average Control Delay	18.0	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	31.5%	ICU Level of Service	A	
Analysis Period (min)	15			

c Critical Lane Group