Technical Memorandum #9 Appendix

The Appendix includes the following sections:

- Base Year Motor Vehicle Volumes
- Preferred Alternative 2030 Future PM Peak Hour Motor Vehicle Volumes
- Synchro Highway Capacity Manual (HCM) Reports
- SimTraffic Queuing Reports

Base Year Motor Vehicle Volumes

Traffic count data was gathered for analysis in the study area. Counts were collected on March 5 and November 12. These counts required adjustments to reach the desired summer condition, known as the 30th Highest Hour (30 HV). To adjust to the counts to the 30 HV condition, the ODOT Analysis Procedure Manual seasonal factoring methodology was applied.

For the US 97 ramp terminals, the on-site Automatic Traffic Recorder (ATR) method was applied. The ATR used to determine the seasonal factor for the ramp terminals is ATR #09-009 (located on the Bend Parkway, 0.23 miles south of Revere Avenue). All ramp terminal count data was taken on November 12. The resulting factor between November 12 and the peak ATR month (August) is 1.18 (119/101 – see below for calculation). Therefore, all movements from and to the Revere and Colorado ramps were factored up by 18 percent.

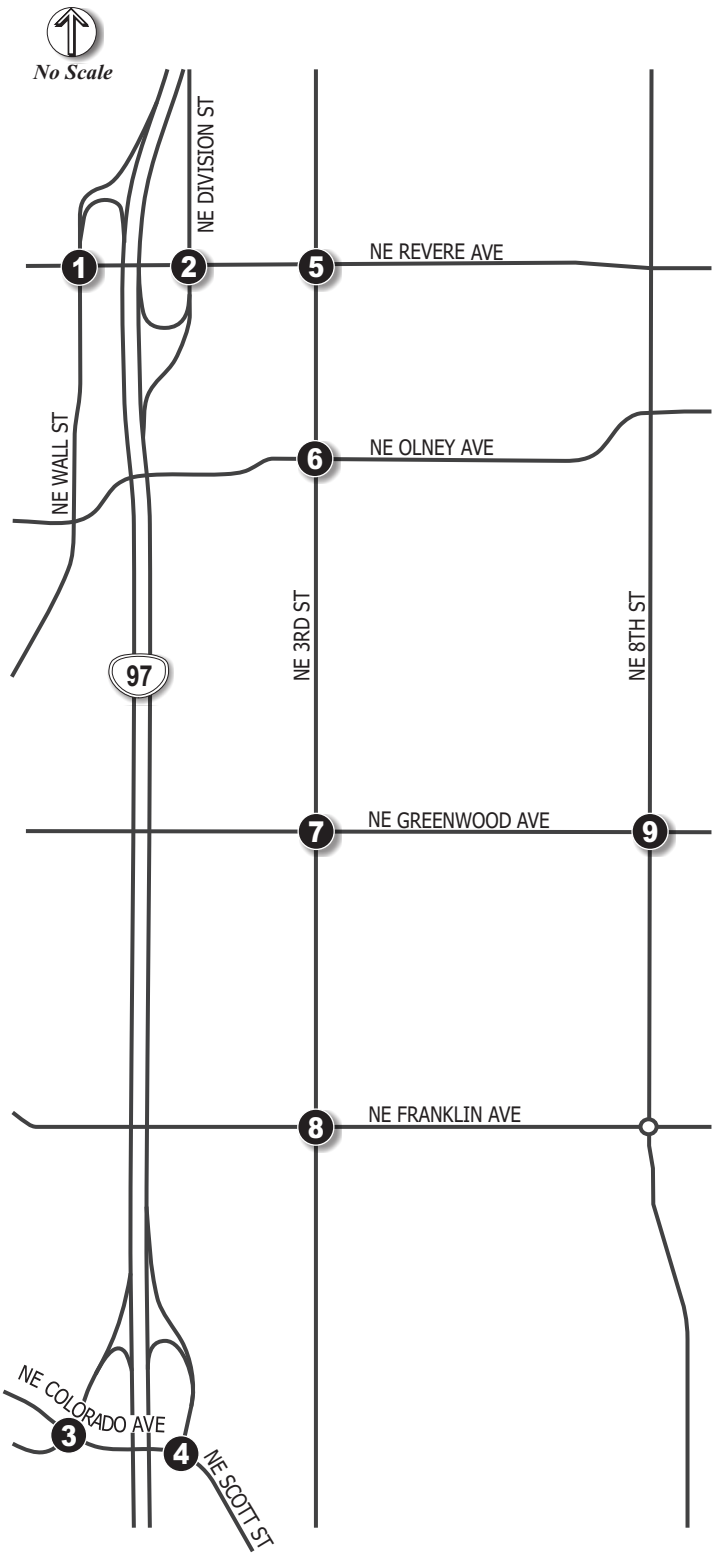
ATR 09-009	**2012**	**2011**	**2010**	**2009**	**2008***	**Average**
Peak Month (August)	120	118	118	116	121	119
Count Month (November)	103	102	98	101	99	101

*In 2008 the peak month was recorded on July
High and low values (shaded in orange) dropped from calculation.

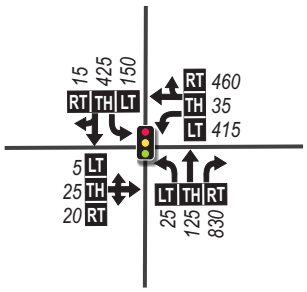
For the 3rd Street and Greenwood Avenue intersections, the seasonal trend table method was applied since there are no on-site ATR's and there are no similar ATR's in the characteristic table. The category that best represents these facilities is the commuter trend. The resulting seasonal factors for counts taken on March 5 (the date on which the 8th Street/Greenwood Avenue count was collected) and November 12 (all other counts) are 1.11 and 1.09 respectively.

Preferred Alternative 2030 Future PM Peak Hour Motor Vehicle Volumes

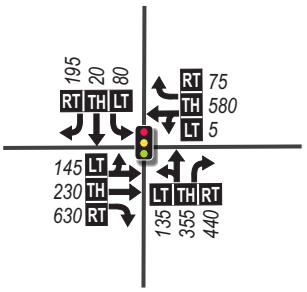
Key Map



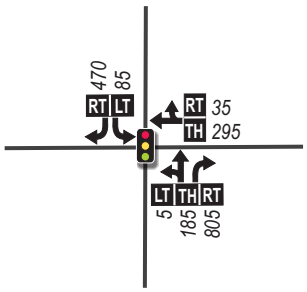
1. US 97 Southbound/Revere Ave.



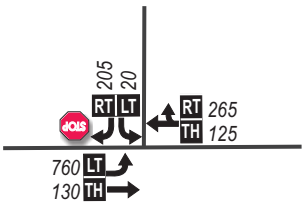
2. US 97 Northbound/Revere Ave.



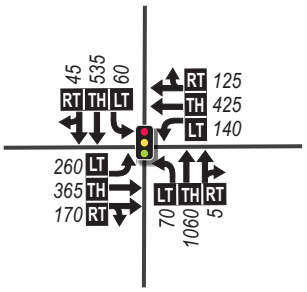
3. US 97 Southbound/Colorado Ave.



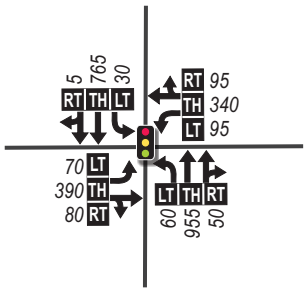
4. US 97 Northbound/Colorado Ave.



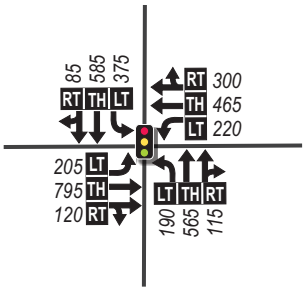
5. 3rd St./Revere Ave.



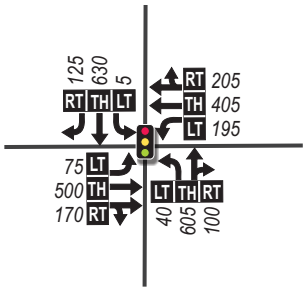
6. 3rd St./Olney Ave.



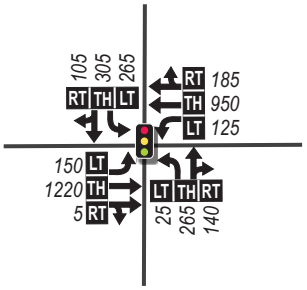
7. 3rd St./Greenwood Ave.



8. 3rd St./Franklin Ave.



9. 8th St./Greenwood Ave.



LEGEND

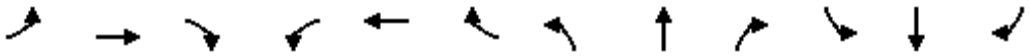
- 0 - Study Intersection
- Traffic Signal
- STOP - Stop Sign
- ← - Lane Configuration
- 000 - PM Peak Hour Traffic Volumes
- LT TH RT (Left•Thru•Right) - Volume Turn Movement

DKS

Figure A1

PREFERRED ALTERNATIVE 2030 FUTURE PM PEAK HOUR MOTOR VEHICLE VOLUMES

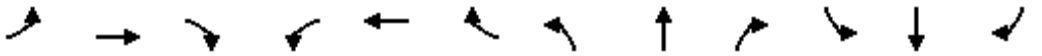
Synchro Highway Capacity Manual (HCM) Reports



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	25	20	415	35	460	25	125	830	150	425	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0		4.0	4.0		4.0	4.0	4.0	4.5	4.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes		1.00		1.00	0.98		1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes		1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.95		1.00	0.86		1.00	1.00	0.85	1.00	0.99	
Flt Protected		1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1568		1630	1457		1662	1716	1444	1330	1720	
Flt Permitted		0.96		0.72	1.00		0.33	1.00	1.00	0.67	1.00	
Satd. Flow (perm)		1516		1241	1457		577	1716	1444	942	1720	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	5	26	21	437	37	484	26	132	874	158	447	16
RTOR Reduction (vph)	0	12	0	0	267	0	0	0	538	0	2	0
Lane Group Flow (vph)	0	40	0	437	254	0	26	132	336	158	461	0
Confl. Peds. (#/hr)	4					4						4
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	10%	0%	2%	0%	1%	0%	2%	3%	25%	1%	5%
Turn Type	Perm	NA		Perm	NA		Perm	NA	Perm	Perm	NA	
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)		21.4		21.4	21.4		18.4	18.4	18.4	17.9	17.9	
Effective Green, g (s)		21.4		21.4	21.4		18.4	18.4	18.4	17.9	18.4	
Actuated g/C Ratio		0.45		0.45	0.45		0.38	0.38	0.38	0.37	0.38	
Clearance Time (s)		4.0		4.0	4.0		4.0	4.0	4.0	4.5	4.5	
Vehicle Extension (s)		4.0		4.0	4.0		2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)		678		555	652		222	660	555	352	662	
v/s Ratio Prot					0.17			0.08			c0.27	
v/s Ratio Perm		0.03		c0.35			0.05		0.23	0.17		
v/c Ratio		0.06		0.79	0.39		0.12	0.20	0.61	0.45	0.70	
Uniform Delay, d1		7.5		11.3	8.8		9.5	9.8	11.8	11.2	12.3	
Progression Factor		1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.1		7.7	0.5		0.2	0.1	1.6	0.7	2.9	
Delay (s)		7.5		19.0	9.4		9.6	9.9	13.4	11.9	15.3	
Level of Service		A		B	A		A	A	B	B	B	
Approach Delay (s)		7.5			13.7			12.8			14.4	
Approach LOS		A			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	13.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	47.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		

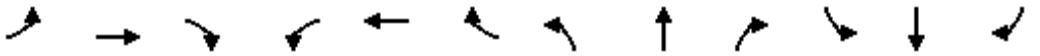
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	145	230	630	5	580	75	135	355	440	80	20	195
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0	4.0		4.0			4.0	4.0	4.0	4.0	4.0
Lane Util. Factor		0.95	1.00		0.95			1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes		1.00	1.00		1.00			1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes		1.00	1.00		1.00			1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		0.98			1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00		1.00			0.99	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3138	1444		3219			1676	1458	1646	1750	1440
Flt Permitted		0.57	1.00		0.95			0.91	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1815	1444		3067			1538	1458	1646	1750	1440
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	153	242	663	5	611	79	142	374	463	84	21	205
RTOR Reduction (vph)	0	0	462	0	12	0	0	0	205	0	0	42
Lane Group Flow (vph)	0	395	201	0	683	0	0	516	258	84	21	163
Confl. Peds. (#/hr)	6					6	1					1
Confl. Bikes (#/hr)						3						
Heavy Vehicles (%)	2%	5%	3%	0%	1%	2%	3%	3%	2%	1%	0%	2%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA	Perm	Prot	NA	Perm
Protected Phases		2			6			8		7	4	
Permitted Phases	2		2	6			8		8			4
Actuated Green, G (s)		20.6	20.6		20.6			28.9	28.9	6.1	39.0	39.0
Effective Green, g (s)		20.6	20.6		20.6			29.4	29.4	6.1	39.5	39.5
Actuated g/C Ratio		0.30	0.30		0.30			0.43	0.43	0.09	0.58	0.58
Clearance Time (s)		4.0	4.0		4.0			4.5	4.5	4.0	4.5	4.5
Vehicle Extension (s)		4.0	4.0		4.0			2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)		549	436		927			663	629	147	1015	835
v/s Ratio Prot										c0.05	0.01	
v/s Ratio Perm		0.22	0.14		c0.22			c0.34	0.18			0.11
v/c Ratio		1.26dl	0.46		0.74			0.78	0.41	0.57	0.02	0.20
Uniform Delay, d1		21.2	19.2		21.3			16.6	13.4	29.7	6.1	6.8
Progression Factor		1.00	1.00		1.00			1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		4.8	1.1		3.3			5.5	0.3	4.3	0.0	0.1
Delay (s)		26.0	20.3		24.6			22.1	13.7	34.1	6.1	6.9
Level of Service		C	C		C			C	B	C	A	A
Approach Delay (s)		22.4			24.6			18.1			14.2	
Approach LOS		C			C			B			B	

Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	68.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.9%	ICU Level of Service	D
Analysis Period (min)	15		

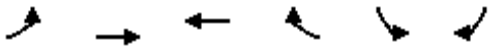
dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	0	0	295	35	5	185	805	85	0	470
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					4.0			4.0	4.0	4.0		4.0
Lane Util. Factor					1.00			1.00	1.00	1.00		1.00
Frpb, ped/bikes					1.00			1.00	0.99	1.00		1.00
Flpb, ped/bikes					1.00			1.00	1.00	1.00		1.00
Frt					0.99			1.00	0.85	1.00		0.85
Flt Protected					1.00			1.00	1.00	0.95		1.00
Satd. Flow (prot)					1700			1731	1450	1646		1340
Flt Permitted					1.00			1.00	1.00	0.38		1.00
Satd. Flow (perm)					1700			1731	1450	662		1340
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	0	0	311	37	5	195	847	89	0	495
RTOR Reduction (vph)	0	0	0	0	5	0	0	60	229	0	0	321
Lane Group Flow (vph)	0	0	0	0	343	0	0	140	618	89	0	174
Confl. Peds. (#/hr)			2	2					1	1		
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	0%	0%	0%	1%	3%	0%	1%	2%	1%	0%	11%
Turn Type					NA		Perm	NA	custom	pm+pt		Perm
Protected Phases					2			4	2	3		
Permitted Phases							4		4	8		8
Actuated Green, G (s)					21.4			7.5	28.9	15.6		15.6
Effective Green, g (s)					21.9			8.0	29.9	16.1		16.1
Actuated g/C Ratio					0.48			0.17	0.65	0.35		0.35
Clearance Time (s)					4.5			4.5	4.5	4.5		4.5
Vehicle Extension (s)					4.0			2.5	4.0	2.5		2.5
Lane Grp Cap (vph)					809			301	1068	319		469
v/s Ratio Prot					0.20				c0.28	0.02		
v/s Ratio Perm								0.08	0.15	0.07		c0.13
v/c Ratio					0.42			0.46	0.58	0.28		0.37
Uniform Delay, d1					7.9			17.1	4.5	10.5		11.2
Progression Factor					1.00			1.00	1.00	1.00		1.00
Incremental Delay, d2					0.5			0.8	0.9	0.3		0.4
Delay (s)					8.4			17.9	5.4	10.9		11.5
Level of Service					A			B	A	B		B
Approach Delay (s)		0.0			8.4			7.8			11.4	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	9.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	46.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		

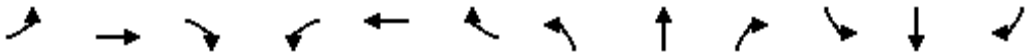
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	760	130	125	265	20	205
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	800	137	132	279	21	216
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						11
Median type		None	None			
Median storage veh)						
Upstream signal (ft)		764				
pX, platoon unblocked						
vC, conflicting volume	411				2008	271
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	411				2008	271
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	30				0	72
cM capacity (veh/h)	1148				19	772

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	800	137	411	237
Volume Left	800	0	0	21
Volume Right	0	0	279	216
cSH	1148	1700	1700	210
Volume to Capacity	0.70	0.08	0.24	1.13
Queue Length 95th (ft)	151	0	0	282
Control Delay (s)	15.0	0.0	0.0	58.6
Lane LOS	B			F
Approach Delay (s)	12.8		0.0	58.6
Approach LOS				F

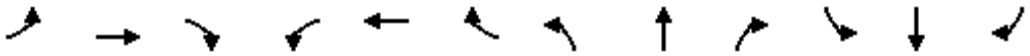
Intersection Summary			
Average Delay	16.3		
Intersection Capacity Utilization	83.9%	ICU Level of Service	E
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	260	365	170	140	425	125	70	1060	5	60	535	45
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.97		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	3087		1630	3168		1630	3226		1614	3079	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1662	3087		1630	3168		1630	3226		1614	3079	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	274	384	179	147	447	132	74	1116	5	63	563	47
RTOR Reduction (vph)	0	48	0	0	25	0	0	0	0	0	5	0
Lane Group Flow (vph)	274	515	0	147	554	0	74	1121	0	63	605	0
Confl. Peds. (#/hr)	11		4	4		11	2					2
Confl. Bikes (#/hr)			1			1						
Heavy Vehicles (%)	0%	2%	2%	2%	1%	0%	2%	3%	2%	3%	7%	2%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	21.0	30.1		14.4	23.5		8.4	50.9		7.6	50.1	
Effective Green, g (s)	21.0	30.6		14.4	24.0		8.4	51.4		7.6	50.6	
Actuated g/C Ratio	0.18	0.26		0.12	0.20		0.07	0.43		0.06	0.42	
Clearance Time (s)	4.0	4.5		4.0	4.5		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.0		2.5	4.0	
Lane Grp Cap (vph)	290	787		195	633		114	1381		102	1298	
v/s Ratio Prot	c0.16	0.17		0.09	c0.17		c0.05	c0.35		0.04	0.20	
v/s Ratio Perm												
v/c Ratio	0.94	0.65		0.75	0.88		0.65	0.81		0.62	0.47	
Uniform Delay, d1	48.9	40.0		51.1	46.6		54.4	30.1		54.8	25.0	
Progression Factor	0.91	1.16		0.99	1.00		1.23	0.75		1.00	1.00	
Incremental Delay, d2	36.4	1.6		9.3	8.4		7.8	3.9		9.1	1.2	
Delay (s)	80.8	48.1		60.0	55.0		74.7	26.3		63.9	26.2	
Level of Service	F	D		E	E		E	C		E	C	
Approach Delay (s)		58.8			56.0			29.3			29.7	
Approach LOS		E			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	42.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.3%	ICU Level of Service	E
Analysis Period (min)	15		

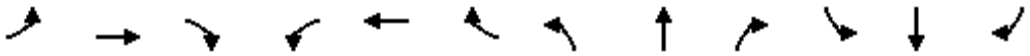
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	390	80	95	340	95	60	955	50	30	765	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.97		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	1673		1599	1665		1614	3204		1630	3133	
Flt Permitted	0.21	1.00		0.13	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	358	1673		217	1665		1614	3204		1630	3133	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	74	411	84	100	358	100	63	1005	53	32	805	5
RTOR Reduction (vph)	0	6	0	0	9	0	0	3	0	0	1	0
Lane Group Flow (vph)	74	489	0	100	449	0	63	1055	0	32	809	0
Confl. Peds. (#/hr)	2					2	4		6	6		4
Confl. Bikes (#/hr)			6			8						
Heavy Vehicles (%)	2%	1%	5%	4%	1%	2%	3%	3%	0%	2%	6%	8%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	44.4	37.7		47.6	39.3		7.5	52.6		4.9	50.0	
Effective Green, g (s)	44.4	37.7		47.6	39.3		7.5	53.1		4.9	50.5	
Actuated g/C Ratio	0.37	0.31		0.40	0.33		0.06	0.44		0.04	0.42	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.0		2.5	4.0	
Lane Grp Cap (vph)	203	525		181	545		100	1417		66	1318	
v/s Ratio Prot	0.02	c0.29		c0.04	0.27		c0.04	c0.33		0.02	0.26	
v/s Ratio Perm	0.11			0.18								
v/c Ratio	0.36	0.93		0.55	0.82		0.63	0.74		0.48	0.61	
Uniform Delay, d1	27.1	39.9		27.2	37.2		54.9	27.8		56.3	27.1	
Progression Factor	1.00	1.00		1.00	1.00		0.90	1.34		1.06	0.70	
Incremental Delay, d2	0.8	23.4		2.9	9.6		7.2	2.4		3.5	1.9	
Delay (s)	28.0	63.3		30.1	46.8		56.6	39.5		63.3	20.9	
Level of Service	C	E		C	D		E	D		E	C	
Approach Delay (s)		58.7			43.8			40.5			22.5	
Approach LOS		E			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	39.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		

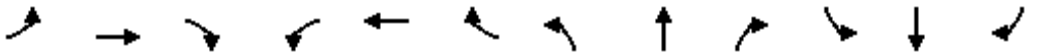
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	205	795	120	220	465	300	190	565	115	375	585	85
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.94		1.00	0.97		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1646	3176		1599	3030		1630	3161		1630	3167	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1646	3176		1599	3030		1630	3161		1630	3167	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	216	837	126	232	489	316	200	595	121	395	616	89
RTOR Reduction (vph)	0	10	0	0	88	0	0	15	0	0	10	0
Lane Group Flow (vph)	216	953	0	232	717	0	200	701	0	395	695	0
Confl. Peds. (#/hr)	6		6	6		6	6		9	9		6
Confl. Bikes (#/hr)			2									
Heavy Vehicles (%)	1%	2%	5%	4%	1%	5%	2%	2%	3%	2%	2%	8%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	15.9	37.2		15.9	37.2		17.0	36.1		13.8	32.9	
Effective Green, g (s)	15.9	37.7		15.9	37.7		17.0	36.6		13.8	33.4	
Actuated g/C Ratio	0.13	0.31		0.13	0.31		0.14	0.31		0.12	0.28	
Clearance Time (s)	4.0	4.5		4.0	4.5		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.0		2.5	4.0	
Lane Grp Cap (vph)	218	997		211	951		230	964		187	881	
v/s Ratio Prot	0.13	c0.30		c0.15	0.24		0.12	c0.22		c0.24	c0.22	
v/s Ratio Perm												
v/c Ratio	0.99	0.96		1.10	0.75		0.87	0.73		2.11	0.79	
Uniform Delay, d1	52.0	40.3		52.0	37.0		50.4	37.2		53.1	40.0	
Progression Factor	1.00	1.00		1.08	0.87		1.00	1.00		1.02	1.41	
Incremental Delay, d2	58.2	18.5		87.5	2.9		27.3	4.8		515.5	6.1	
Delay (s)	110.1	58.9		143.7	35.2		77.8	42.0		569.7	62.7	
Level of Service	F	E		F	D		E	D		F	E	
Approach Delay (s)		68.3			59.5			49.8			244.7	
Approach LOS		E			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	108.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	112.0%	ICU Level of Service	H
Analysis Period (min)	15		

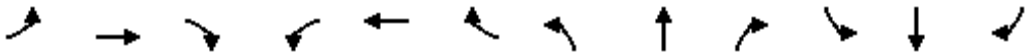
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	500	170	195	405	205	40	605	100	5	630	125
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.96		1.00	0.95		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1630	3114		1630	3039		1599	1675		1630	1699	1385
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1630	3114		1630	3039		1599	1675		1630	1699	1385
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	79	526	179	205	426	216	42	637	105	5	663	132
RTOR Reduction (vph)	0	27	0	0	52	0	0	4	0	0	0	66
Lane Group Flow (vph)	79	678	0	205	590	0	42	738	0	5	663	67
Confl. Peds. (#/hr)	13		5	5		13	8		6	6		8
Confl. Bikes (#/hr)			2			11			1			2
Heavy Vehicles (%)	2%	1%	4%	2%	3%	2%	4%	2%	2%	2%	3%	5%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												6
Actuated Green, G (s)	8.5	25.8		16.7	34.0		6.5	59.7		1.3	54.5	54.5
Effective Green, g (s)	8.5	25.8		16.7	34.0		6.5	60.2		1.3	55.0	54.5
Actuated g/C Ratio	0.07	0.22		0.14	0.28		0.05	0.50		0.01	0.46	0.45
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.5		4.0	4.5	4.5
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.0		2.5	4.0	4.0
Lane Grp Cap (vph)	115	669		226	861		86	840		17	778	629
v/s Ratio Prot	0.05	c0.22		c0.13	0.19		c0.03	c0.44		0.00	0.39	
v/s Ratio Perm												0.05
v/c Ratio	0.69	1.01		0.91	0.69		0.49	0.88		0.29	0.85	0.11
Uniform Delay, d1	54.5	47.1		50.9	38.2		55.1	26.6		58.9	28.9	18.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	14.5	38.0		35.4	2.1		3.2	12.6		6.9	11.4	0.3
Delay (s)	68.9	85.1		86.3	40.3		58.3	39.2		65.8	40.3	19.1
Level of Service	E	F		F	D		E	D		E	D	B
Approach Delay (s)		83.5			51.4			40.2			36.9	
Approach LOS		F			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	52.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	150	1220	5	125	950	185	25	265	140	265	305	105
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.98		1.00	0.95		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	3257		1614	3120		1646	1640		1614	1661	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1662	3257		1614	3120		1646	1640		1614	1661	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	158	1284	5	132	1000	195	26	279	147	279	321	111
RTOR Reduction (vph)	0	0	0	0	14	0	0	15	0	0	10	0
Lane Group Flow (vph)	158	1289	0	132	1181	0	26	411	0	279	422	0
Confl. Peds. (#/hr)	4		4	4		4	5		2	2		5
Confl. Bikes (#/hr)						3			1			1
Heavy Vehicles (%)	0%	2%	3%	3%	3%	5%	1%	1%	0%	3%	1%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	1	6		5	2		7	4		3	8	
Permitted Phases												
Actuated Green, G (s)	11.0	44.5		9.0	42.5		4.7	32.6		19.0	46.4	
Effective Green, g (s)	11.0	45.0		9.0	43.0		4.7	32.6		19.0	46.9	
Actuated g/C Ratio	0.09	0.37		0.07	0.35		0.04	0.27		0.16	0.39	
Clearance Time (s)	4.0	4.5		4.0	4.5		4.0	4.0		4.0	4.5	
Vehicle Extension (s)	2.5	4.0		2.5	4.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	150	1205		119	1103		63	439		252	640	
v/s Ratio Prot	c0.10	c0.40		0.08	0.38		0.02	c0.25		c0.17	0.25	
v/s Ratio Perm												
v/c Ratio	1.05	1.07		1.11	1.07		0.41	0.94		1.11	0.66	
Uniform Delay, d1	55.3	38.3		56.3	39.3		57.1	43.5		51.3	30.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	88.4	46.8		114.9	48.3		3.2	27.2		88.4	2.2	
Delay (s)	143.7	85.1		171.2	87.6		60.3	70.7		139.7	33.0	
Level of Service	F	F		F	F		E	E		F	C	
Approach Delay (s)		91.5			95.9			70.1			74.9	
Approach LOS		F			F			E			E	

Intersection Summary			
HCM 2000 Control Delay	87.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	121.6	Sum of lost time (s)	16.0
Intersection Capacity Utilization	98.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

SimTraffic Queuing Reports

Intersection: 1: Wall St/US 97 SB & Revere Ave

Movement	EB	WB	WB	NB	NB	NB	SB	SB
Directions Served	LTR	L	TR	L	T	R	L	TR
Maximum Queue (ft)	86	387	291	86	713	490	507	565
Average Queue (ft)	27	189	133	16	645	481	241	199
95th Queue (ft)	67	330	252	53	854	556	505	528
Link Distance (ft)	325	654	654		646			973
Upstream Blk Time (%)					64			2
Queuing Penalty (veh)					0			0
Storage Bay Dist (ft)				200		400	525	
Storage Blk Time (%)					0	80	5	0
Queuing Penalty (veh)					1	120	23	1

Intersection: 2: US 97 NB/Division St & Revere Ave

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LT	T	R	LT	TR	LT	R	L	T	R
Maximum Queue (ft)	529	404	218	374	413	933	170	157	66	126
Average Queue (ft)	287	147	101	189	209	615	157	67	9	53
95th Queue (ft)	501	314	173	341	370	1134	212	128	36	101
Link Distance (ft)	654	654		450	450	899			599	
Upstream Blk Time (%)	0			1	1	21				
Queuing Penalty (veh)	0			2	2	0				
Storage Bay Dist (ft)			150				120	200		100
Storage Blk Time (%)		2	1			38	10	0		1
Queuing Penalty (veh)		15	1			165	48	0		1

Intersection: 3: Arizona Ave/US 97 SB & Colorado Ave

Movement	WB	NB	NB	SB	SB
Directions Served	TR	LT	R	L	R
Maximum Queue (ft)	196	1657	1846	308	208
Average Queue (ft)	61	801	1288	82	119
95th Queue (ft)	142	2254	2572	208	202
Link Distance (ft)	689	2230	2230	838	
Upstream Blk Time (%)		9	15		
Queuing Penalty (veh)		0	0		
Storage Bay Dist (ft)					140
Storage Blk Time (%)				3	6
Queuing Penalty (veh)				13	5

Intersection: 4: Colorado Ave/Scott Ave & US 97 NB

Movement	EB	EB	WB	SB	SB
Directions Served	L	T	TR	L	R
Maximum Queue (ft)	280	711	70	897	222
Average Queue (ft)	275	635	27	623	33
95th Queue (ft)	314	916	58	1174	160
Link Distance (ft)		689	702	885	
Upstream Blk Time (%)		12		56	
Queuing Penalty (veh)		111		0	
Storage Bay Dist (ft)	230				265
Storage Blk Time (%)	69	0		68	0
Queuing Penalty (veh)	90	1		137	0