



ALDRIDGE TRANSPORTATION CONSULTANTS, LLC

Advanced Transportation Planning and Traffic Engineering

John M.W. Aldridge, P.E.
Colorado Licensed Professional Engineer

1082 Chimney Rock Road
Highlands Ranch, CO 80126
303-703-9112
Mobile: 303-594-4132
john@atceng.com

March 3, 2019

Ms. Kay Stallworthy
Cadence Capital Investments
6400 E. Fiddlers Green Circle Suite 1820
Greenwood Village, CO 80011

Re: Traffic Impact Study - Revised
SWC 88th Ave. and Rosemary St. – Commerce City, CO

Dear Ms. Stallworthy:

Aldridge Transportation Consultants (ATC) is pleased to present this traffic impact study regarding the proposed development of the SWC of 88th Ave./Rosemary St. in Commerce City.

ATC is professional service firm specializing in traffic engineering and transportation planning. ATC's principal, John M.W. Aldridge, is a Colorado licensed professional engineer. In the past 20 years, ATC has prepared over 1,000 traffic impact studies, designed over 100 traffic signals, and has provided expert witness testimony on engineering design and access issues on multi-million dollar interchange and highway projects in Kansas and Colorado.

ATC appreciates the opportunity to be of service. Please call if you have any questions. We can be reached at 303-703-9112.



Respectfully submitted,

Aldridge Transportation Consultants, LLC

John M.W. Aldridge, P.E.
Principal



1. Introduction/Project Description

This traffic impact study provides an analysis of the potential impact on traffic operations and safety of adjacent streets and intersections occasioned by the development of property on the southwest corner of 88th Ave. and Rosemary St. in Commerce City. The site is adjacent to the UPRR tracks and approximately 3/4 mile east of I-76. Figure 1 shows the site plan and the adjacent streets and intersections.

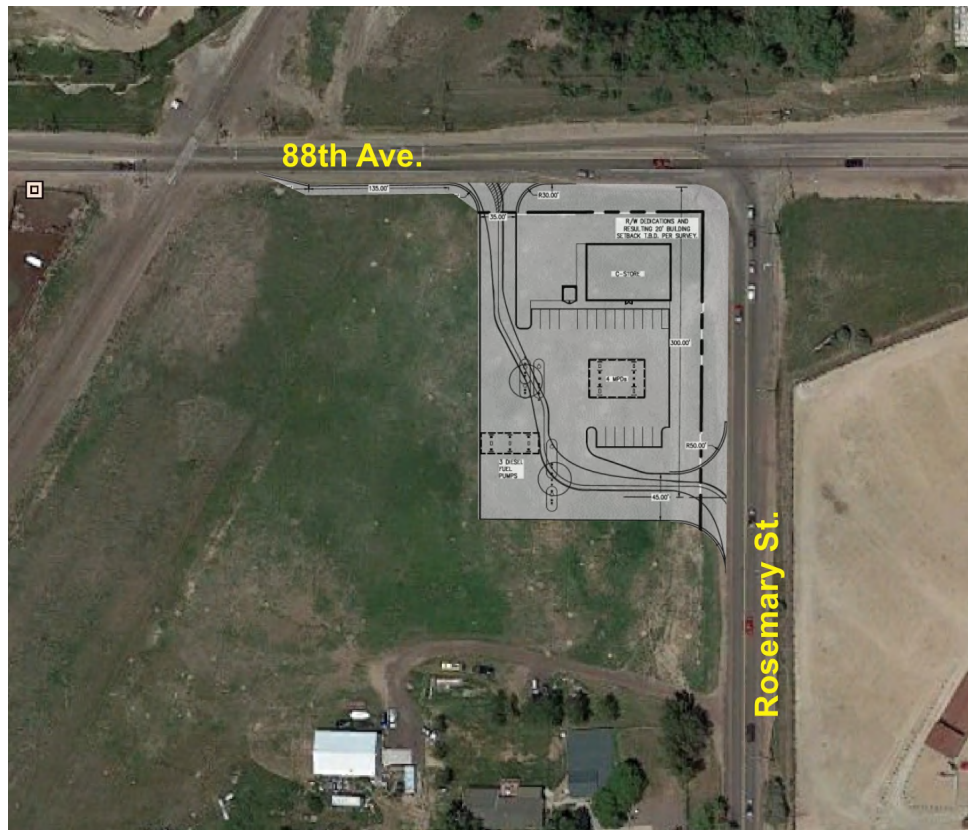


Figure 1 Site Plan and Adjacent Streets and Intersections

The site will be developed with a 4,000 square foot convenience store and gas station. The gas station will have 14 fuel dispensers – six for diesel fuel and 8 for regular fuel. Two access locations are proposed. The access to 88th Ave. will be a right in/right out only and the other on Rosemary St. approximately 300 feet south of 88th St. It will be full-movement.



2. Existing Conditions

88th Ave. is a 2-lane Minor Arterial that currently carries about 16,000 ADT on the west leg of the intersection with Rosemary St. and 7,500 ADT on the east leg. It is undivided and posted at 40 mph. 88th Ave. extends to and terminates Hwy. 2 on the east end.

Rosemary St. is a 2-lane undivided Major Collector. It carries around 11,000 ADT and is posted at 35 mph. It also extends to and terminates at Hwy. 2 on the south end of the street.

The intersection of Rosemary St. and 88th Ave. is traffic signal controlled. The westbound approach includes a 100-foot right turn lane. On the eastbound approach there is a 160-foot left turn lane. And on the northbound approach there are 100-foot left turn and right turn lanes. The left turn phasing of the eastbound approach is protected/permitted.

AM and PM peak hour counts were taken at the 88th Ave. and Rosemary St. intersection on Tuesday, September 11, 2018. The counts are attached for reference.

3. Proposed Conditions

The trip generation rates and values for the proposed use, Convenience Store with Gas Station (ITE Code 945), are provided by the *ITE Trip Generation Manual, 10th Edition*. The table presents the Average Daily Trips and the AM and PM peak hour trips

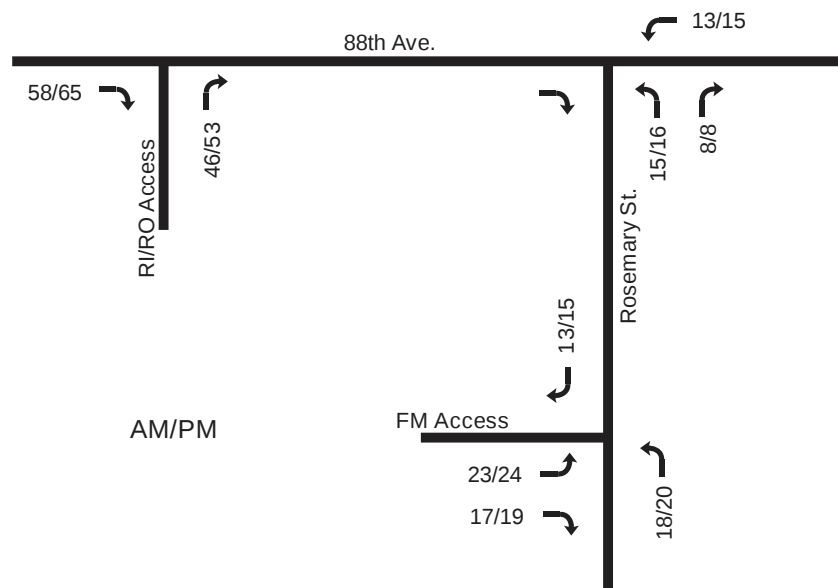
Trip Generation Table								
ITE Code	Land Use	Variable	Quantity	ADT	AM in	AM out	PM in	PM out
945	Convenience Store w/ Gas	Fueling Positions	14	205.36	6.36	6.11	7.13	6.86
				2875	89	86	100	96
Total Trips				2875	89	86	100	96

The AM and PM peak hours are the highest time of travel on the adjacent streets and at the intersections and therefore considered the design hour volume (DHV) for operations analysis and geometric design purposes.



Traffic in and out of convenience stores and gas stations are generally made in the same direction. The pass-by trip percent is approximately 56 percent per the ITE Trip Generation Handbook, 3rd Edition.

The trip distribution and assignment assume that 65 percent of the trips will enter/exit to/from the eastbound traffic on 88th Ave. and that 15 percent will enter/exit to/from the westbound direction on 88th Ave. by diverting from 88th Ave. to the access on Rosemary St. The remaining 20 percent will enter/exit to/from the northbound direction on Rosemary St. At the intersection of 88th and Rosemary St. the generated traffic as assigned based on the percent split of the existing turning movements. The trip distribution and assignment are depicted in the graphic below and on the Synchro graphics attached in the appendix.



4. Background and Future Conditions

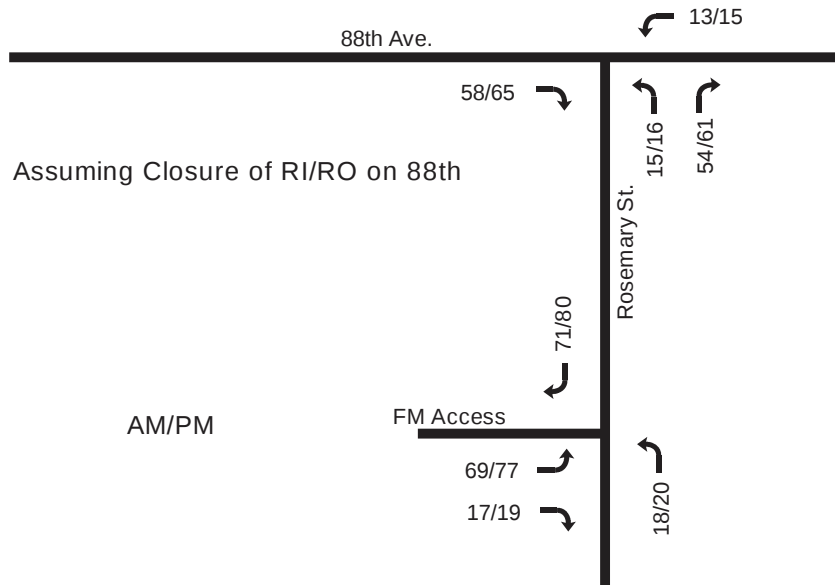
The City's 2010 Transportation Plan has programmed a future grade separated crossing at the existing 88th Ave. and Union Pacific Rail Road at-grade crossing. When this improvement is constructed, which is a medium priority through to 2035 (could be longer), the access to 88th Ave. will be closed. In addition to the bridge, the plan proposes to widen 88th Ave. from 2 lanes to 4 lanes. This is also a medium priority project; however, it will probably be done concurrently with the bridge construction.



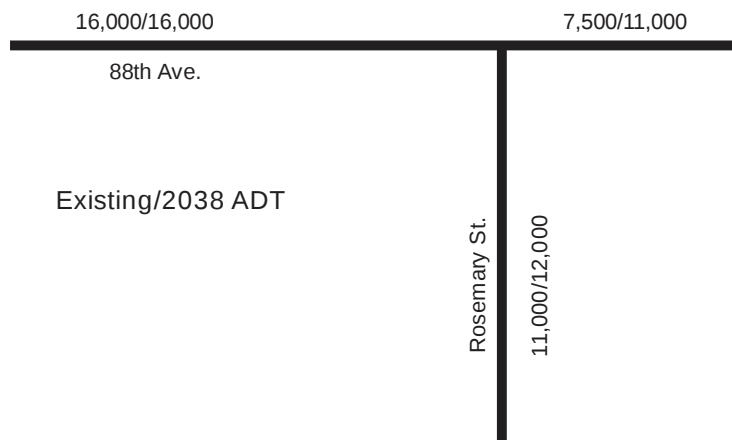
SWC 88TH & ROSEMARY

Transportation Impact Study

When the bridge is constructed, the primary access to the site on 88th Ave. will shift to Rosemary St. The graphic shows the adjusted distribution and assignment of the site generated trips.



Forecast volumes in the transportation plan for this section of 88th Ave. indicate that it will carry 16,000 ADT by 2035. This equates a zero percent increase on the west leg. On the east leg the plan shows 11,000 ADT vs the existing 7,500 ADT. On Rosemary St. the plan forecasts in 2035 and increase from the existing 11,000 ADT to 12,000 ADT. Overall this represents an approximate 1.15 20-year growth factor. The existing and 2038 ADT is shown on the graphic below.





5. Operations Evaluation

ATC uses Synchro v.10 for operations analyses. The Synchro v.10 methodology is based on the Highway Capacity Manual 6th Edition (HCM). The Synchro HCM reports are attached for reference. LOS is letter rating from A to F. LOS A indicates free-flow traffic conditions and no delay at intersections. LOS F is heavy traffic congestion with significant delay. LOS is provided for the overall operations at signalized intersections. LOS D is generally the benchmark for acceptable signalized intersection operations during the weekday peak hours. The critical movement, not the overall, provides the LOS rating for unsignalized intersections. The critical movement is generally a left turn from the minor approach. Caution is advised when evaluating the LOS at unsignalized intersections particularly when LOS F shows. In cases of a LOS F, the HCM suggests that other evaluation measures should be considered such as the volume over capacity ratio and 95th percentile queue length to make the most effective traffic control decision. LOS F at unsignalized intersections is often normal for the average weekday peak hour.

The intersection of 88th Ave. and Rosemary St. currently operates at LOS E/D in the AM and PM peak hours. With the additional traffic in the AM and PM peak hours the near term 2019 LOS will move to F/D. The poor LOS at this intersection is due primarily to the heavy eastbound to southbound right turn movement. A significant improvement in the LOS at the 88th Ave./Rosemary intersection could be achieved by making the right turn lane into the access a continuous acceleration/deceleration lane and channelizing the right turn lane at Rosemary St. for a “free” (yield control unless there is an acceleration lane) movement. The improvement would also significantly benefit the access on 88th Ave. by allowing the right turn movement to stay in the lane for a right turn at Rosemary St. All other movements in the intersection operate at an acceptable level of service and will continue to do so in the 2019 and 2038 conditions.

The following table provides a summary of the LOS with the recommended improvements.



SWC 88TH & ROSEMARY Transportation Impact Study

Unsignalized Intersection LOS Summary										
LOS/Control Delay (secs) A=0-10, B=>10-15, C=>15-25, D=>25-35, E=>35-50, F=>50										
Intersection	Existing		2019		2038		2038 w/Closure		2038 /Roundabout	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
88th/RIRO	n/a	n/a	B	B	D	B	n/a	n/a	n/a	n/a
Rosemary/FM	n/a	n/a	F	F	F	F	F*	F*	C	A

Signalized Intersection LOS Summary										
LOS/Control Delay (secs) A=0-10, B=>10-20, C=>20-35, D=>35-55, E=>55-80, F=>80										
Intersection	Existing		2019		2038		2038 w/Closure		2038 /Roundabout	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
88th/Rosemary	E	D	C	C	C	C	B	C	B	C

*significant delay and queuing

The right in/right out access will operate acceptably at LOS B/B in the 2019 condition. In the 2038 condition it will operate at LOS D/B which is also acceptable.

The full-movement on Rosemary will operate at LOS F/F in 2019 and 2038 conditions with the RI/RO in place on 88th Ave. This is generally considered normal for unsignalized intersections in the peak hours. The 95% percentile queue length ranges from 4 vehicles to 7 vehicles at the Rosemary St. access on the eastbound to northbound left turn movement. The queue will occur on site however, and not impact the traffic flow on Rosemary St. to any substantial degree.

With the closure of the RI/RO on 88th Ave. the traffic volume on the eastbound to northbound left turn movement at the full-movement on Rosemary St. will experience significant delay and queuing. Two options are available to correct the poor LOS. Option 1 is a traffic signal, however the proximity to 88th Ave. is problematic. Option 2 is a single lane roundabout. Tests of the roundabout option shows that it would operate at an acceptable LOS C/A.

6. Proposed Mitigation Measures

The right turn in volume from 88th Ave. of 58 vph in the AM peak hour and 65 vph in the PM peak hour above the threshold of 20 vph that requires a right turn auxiliary lane per the City's Construction Standards and Specifications Table 3-6. While the recommended deceleration lane length of 135 feet can be deployed, the 15:1 recommended taper cannot as it would violate the UPRR buffer requirement. The recommended taper in this instance is 4:1 or approximately 48 feet. In addition, the right turn lane should be extended to Rosemary St. to form a continuous right turn lane. At



Rosemary St. the right turn lane should be channelized to create a free or yield right turn movement.

A left turn in auxiliary lane at the access on 88th Ave. will not be allowed. The movement will be prohibited by signing and deployment of painted traffic island. A right turn auxiliary lane is not required at the Rosemary St. based on the 13/15 vph right turn in movement in the AM/PM Peak Hour. However, to make the eastbound to southbound right turn acceleration lane function properly it should continue south to the full-movement access.

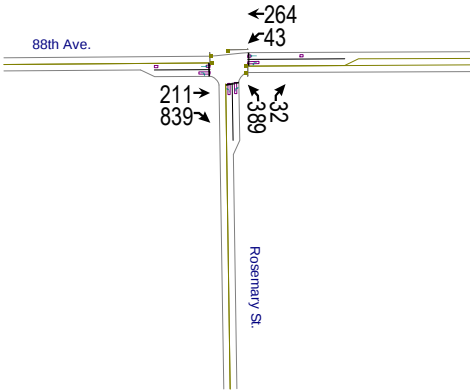
A northbound left turn deceleration lane is required on a Major Collector regardless of volume. It should be 90-feet in length and taper in at 13.5:1.

7. Conclusions/Recommendations

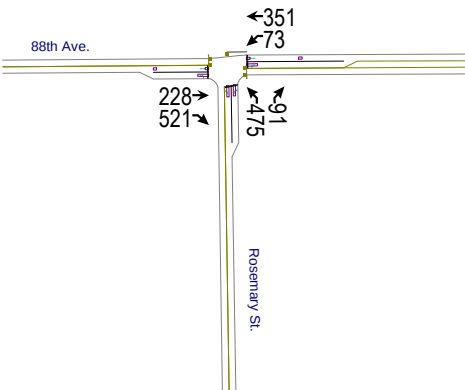
Based on the analysis contained herein, the adjacent streets and intersections can absorb the traffic generated by the Convenience Store and Gas Station and operate at an acceptable level of service assuming the recommended improvements are in place. The proposed access locations and type are a “best fit” for safe operations and the type of use they will serve.



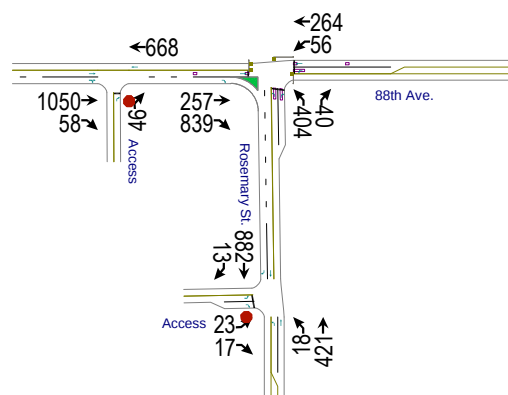
APPENDIX



	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	211	839	43	264	389	32
Future Volume (veh/h)	211	839	43	264	389	32
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	229	912	47	287	423	35
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	912	773	325	1068	584	520
Arrive On Green	0.49	0.49	0.03	0.57	0.33	0.33
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	229	912	47	287	423	35
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	8.5	58.0	1.5	9.2	24.9	1.8
Cycle Q Clear(g_c), s	8.5	58.0	1.5	9.2	24.9	1.8
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	912	773	325	1068	584	520
V/C Ratio(X)	0.25	1.18	0.14	0.27	0.72	0.07
Avail Cap(c_a), veh/h	912	773	341	1085	584	520
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	17.8	30.5	13.6	12.9	35.2	27.5
Incr Delay (d2), s/veh	0.1	94.1	0.2	0.1	7.6	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	41.4	0.6	3.9	12.0	0.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	17.9	124.6	13.8	13.0	42.9	27.7
LnGrp LOS	B	F	B	B	D	C
Approach Vol, veh/h	1141			334	458	
Approach Delay, s/veh	103.2			13.2	41.7	
Approach LOS	F			B	D	
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	9.9	64.0			73.9	45.0
Change Period (Y+Rc), s	6.0	6.0			6.0	6.0
Max Green Setting (Gmax), s	5.0	58.0			69.0	39.0
Max Q Clear Time (g_c+l1), s	3.5	60.0			11.2	26.9
Green Ext Time (p_c), s	0.0	0.0			1.9	1.2
Intersection Summary						
HCM 6th Ctrl Delay			73.1			
HCM 6th LOS			E			



						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	228	521	73	351	475	91
Future Volume (veh/h)	228	521	73	351	475	91
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	248	566	79	382	516	99
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	687	582	313	856	788	701
Arrive On Green	0.37	0.37	0.04	0.46	0.44	0.44
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	248	566	79	382	516	99
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	11.6	42.1	3.2	16.7	27.3	4.5
Cycle Q Clear(g_c), s	11.6	42.1	3.2	16.7	27.3	4.5
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	687	582	313	856	788	701
V/C Ratio(X)	0.36	0.97	0.25	0.45	0.65	0.14
Avail Cap(c_a), veh/h	687	582	316	858	788	701
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.7	37.3	21.7	22.2	26.2	19.9
Incr Delay (d2), s/veh	0.3	30.3	0.4	0.4	4.2	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	20.9	1.4	7.4	12.3	1.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	28.0	67.6	22.1	22.5	30.5	20.3
LnGrp LOS	C	E	C	C	C	C
Approach Vol, veh/h	814			461	615	
Approach Delay, s/veh	55.6			22.4	28.8	
Approach LOS	E			C	C	
Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	10.8	50.0			60.8	59.0
Change Period (Y+Rc), s	6.0	6.0			6.0	6.0
Max Green Setting (Gmax), s	5.0	44.0			55.0	53.0
Max Q Clear Time (g_c+I1), s	5.2	44.1			18.7	29.3
Green Ext Time (p_c), s	0.0	0.0			2.6	2.1
Intersection Summary						
HCM 6th Ctrl Delay			38.8			
HCM 6th LOS			D			



	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Volume (veh/h)	257	839	56	264	404	40
Future Volume (veh/h)	257	839	56	264	404	40
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	279	0	61	287	439	43
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	355		225	582	959	854
Arrive On Green	0.19	0.00	0.05	0.31	0.54	0.54
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	279	0	61	287	439	43
Grp Sat Flow(s), veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	11.3	0.0	2.1	10.0	12.1	1.0
Cycle Q Clear(g_c), s	11.3	0.0	2.1	10.0	12.1	1.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	355		225	582	959	854
V/C Ratio(X)	0.79		0.27	0.49	0.46	0.05
Avail Cap(c_a), veh/h	1265		254	1523	959	854
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.8	0.0	23.8	22.4	11.3	8.7
Incr Delay (d2), s/veh	3.9	0.0	0.6	0.6	1.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.3	0.0	0.9	4.3	4.7	0.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	34.7	0.0	24.4	23.0	12.9	8.9
LnGrp LOS	C		C	C	B	A
Approach Vol, veh/h	279	A		348	482	
Approach Delay, s/veh	34.7			23.3	12.5	
Approach LOS	C			C	B	
Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		49.0	9.7	21.1		30.8
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s		43.0	5.0	54.0		65.0
Max Q Clear Time (g_c+l1), s		14.1	4.1	13.3		12.0
Green Ext Time (p_c), s		1.6	0.0	1.8		1.9
Intersection Summary						
HCM 6th Ctrl Delay			21.5			
HCM 6th LOS			C			

Notes

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Intersection

Int Delay, s/veh 0.4

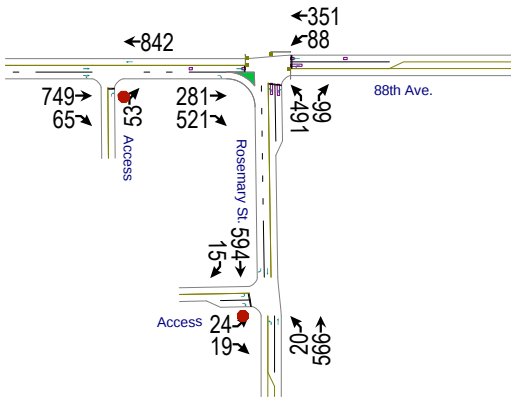
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑		↑
Traffic Vol, veh/h	1050	58	0	668	0	46
Future Vol, veh/h	1050	58	0	668	0	46
Conflicting Peds, #/hr	0	0	693	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1141	63	0	726	0	50

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	- - - 602
Stage 1	-	-	- - -
Stage 2	-	-	- - -
Critical Hdwy	-	-	- - - 6.93
Critical Hdwy Stg 1	-	-	- - -
Critical Hdwy Stg 2	-	-	- - -
Follow-up Hdwy	-	-	- - - 3.319
Pot Cap-1 Maneuver	-	-	0 - 0 444
Stage 1	-	-	0 - 0
Stage 2	-	-	0 - 0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	- - - 444
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

Approach	EB	WB	NB
HCM Control Delay, s	0	0	14.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT
Capacity (veh/h)	444	-	-	-
HCM Lane V/C Ratio	0.113	-	-	-
HCM Control Delay (s)	14.1	-	-	-
HCM Lane LOS	B	-	-	-
HCM 95th %tile Q(veh)	0.4	-	-	-

Intersection						
Int Delay, s/veh	6.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	23	17	18	421	882	13
Future Vol, veh/h	23	17	18	421	882	13
Conflicting Peds, #/hr	0	0	401	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	50	100	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	25	18	20	458	959	14
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1858	1360	1374	0	-	0
Stage 1	1360	-	-	-	-	-
Stage 2	498	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	81	182	499	-	-	-
Stage 1	239	-	-	-	-	-
Stage 2	611	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	29	112	308	-	-	-
Mov Cap-2 Maneuver	29	-	-	-	-	-
Stage 1	138	-	-	-	-	-
Stage 2	378	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	202.3	0.7		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	308	-	29	112	-	-
HCM Lane V/C Ratio	0.064	-	0.862	0.165	-	-
HCM Control Delay (s)	17.5	-	319.7	43.4	-	-
HCM Lane LOS	C	-	F	E	-	-
HCM 95th %tile Q(veh)	0.2	-	2.8	0.6	-	-



						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	281	521	88	351	491	99
Future Volume (veh/h)	281	521	88	351	491	99
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	305	0	96	382	534	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	362		212	580	1018	906
Arrive On Green	0.19	0.00	0.06	0.31	0.57	0.57
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	305	0	96	382	534	108
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	15.9	0.0	4.2	18.0	18.6	3.2
Cycle Q Clear(g_c), s	15.9	0.0	4.2	18.0	18.6	3.2
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	362		212	580	1018	906
V/C Ratio(X)	0.84		0.45	0.66	0.52	0.12
Avail Cap(c_a), veh/h	701		216	922	1018	906
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	39.4	0.0	30.3	30.3	13.3	10.0
Incr Delay (d2), s/veh	5.3	0.0	1.5	1.3	1.9	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.8	0.0	1.9	8.1	7.5	1.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	44.7	0.0	31.8	31.6	15.2	10.3
LnGrp LOS	D		C	C	B	B
Approach Vol, veh/h	305	A		478	642	
Approach Delay, s/veh	44.7			31.7	14.4	
Approach LOS	D			C	B	
Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		64.0	11.8	25.7		37.5
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s		58.0	6.0	38.0		50.0
Max Q Clear Time (g_c+I1), s		20.6	6.2	17.9		20.0
Green Ext Time (p_c), s		2.2	0.0	1.7		2.5
Intersection Summary						
HCM 6th Ctrl Delay			26.7			
HCM 6th LOS			C			

Notes

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Intersection						
Int Delay, s/veh	0.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↱			↑		↱
Traffic Vol, veh/h	749	65	0	842	0	53
Future Vol, veh/h	749	65	0	842	0	53
Conflicting Peds, #/hr	0	0	693	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	814	71	0	915	0	58
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	443
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	-	0	-	0	563
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	563
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		12.1	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT		
Capacity (veh/h)	563	-	-	-		
HCM Lane V/C Ratio	0.102	-	-	-		
HCM Control Delay (s)	12.1	-	-	-		
HCM Lane LOS	B	-	-	-		
HCM 95th %tile Q(veh)	0.3	-	-	-		

Intersection

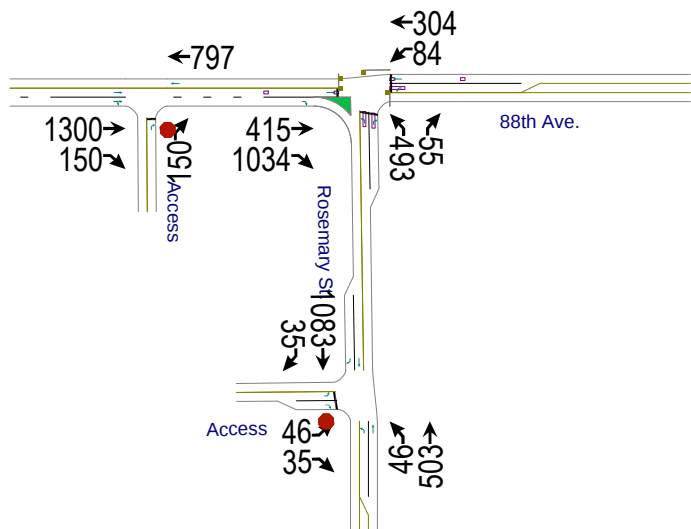
Int Delay, s/veh 5.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	24	19	20	566	594	15
Future Vol, veh/h	24	19	20	566	594	15
Conflicting Peds, #/hr	0	0	401	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	50	100	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	26	21	22	615	646	16

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1706	1047	1063
Stage 1	1047	-	-
Stage 2	659	-	-
Critical Hdwy	6.42	6.22	4.12
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.218
Pot Cap-1 Maneuver	100	277	655
Stage 1	338	-	-
Stage 2	515	-	-
Platoon blocked, %			
Mov Cap-1 Maneuver	36	171	405
Mov Cap-2 Maneuver	36	-	-
Stage 1	198	-	-
Stage 2	318	-	-

Approach	EB	NB	SB
HCM Control Delay, s	143.4	0.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	405	-	36	171	-	-
HCM Lane V/C Ratio	0.054	-	0.725	0.121	-	-
HCM Control Delay (s)	14.4	-	234	28.9	-	-
HCM Lane LOS	B	-	F	D	-	-
HCM 95th %tile Q(veh)	0.2	-	2.6	0.4	-	-



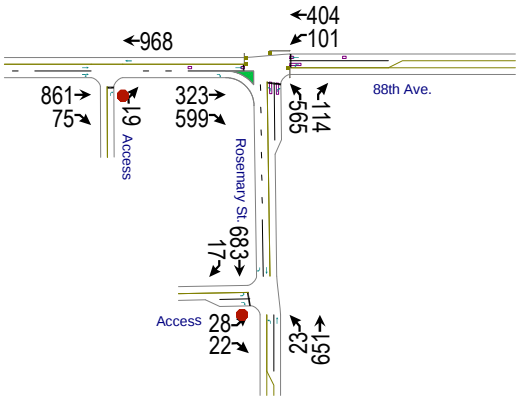
						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	361	899	73	264	429	48
Future Volume (veh/h)	361	899	73	264	429	48
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	451	0	91	330	536	60
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	532		225	722	915	814
Arrive On Green	0.28	0.00	0.05	0.39	0.51	0.51
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	451	0	91	330	536	60
Grp Sat Flow(s), veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	20.3	0.0	3.1	11.8	18.7	1.7
Cycle Q Clear(g_c), s	20.3	0.0	3.1	11.8	18.7	1.7
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	532		225	722	915	814
V/C Ratio(X)	0.85		0.40	0.46	0.59	0.07
Avail Cap(c_a), veh/h	1161		236	1362	915	814
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.1	0.0	22.5	20.5	15.1	11.0
Incr Delay (d2), s/veh	3.8	0.0	1.2	0.5	2.7	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.4	0.0	1.3	5.0	7.8	0.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	34.0	0.0	23.7	20.9	17.9	11.2
LnGrp LOS	C		C	C	B	B
Approach Vol, veh/h	451	A		421	596	
Approach Delay, s/veh	34.0			21.5	17.2	
Approach LOS	C			C	B	
Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		50.4	9.1	29.9		39.0
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		45.9	5.1	55.5		65.1
Max Q Clear Time (g_c+I1), s		20.7	5.1	22.3		13.8
Green Ext Time (p_c), s		2.0	0.0	3.1		2.2
Intersection Summary						
HCM 6th Ctrl Delay			23.6			
HCM 6th LOS			C			

Notes

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Intersection						
Int Delay, s/veh	1.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↱			↑		↱
Traffic Vol, veh/h	1130	130	0	693	0	130
Future Vol, veh/h	1130	130	0	693	0	130
Conflicting Peds, #/hr	0	0	693	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1413	163	0	866	0	163
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	787
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	-	0	-	0	335
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	335
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		25.5	
HCM LOS	D					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT		
Capacity (veh/h)	335	-	-	-		
HCM Lane V/C Ratio	0.485	-	-	-		
HCM Control Delay (s)	25.5	-	-	-		
HCM Lane LOS	D	-	-	-		
HCM 95th %tile Q(veh)	2.5	-	-	-		

Intersection						
Int Delay, s/veh	47.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	40	30	40	437	942	30
Future Vol, veh/h	40	30	40	437	942	30
Conflicting Peds, #/hr	0	0	401	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	50	100	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	50	38	50	546	1178	38
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	2225	1579	1617	0	-	0
Stage 1	1579	-	-	-	-	-
Stage 2	646	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 47	135	403	-	-	-
Stage 1	186	-	-	-	-	-
Stage 2	522	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 14	83	249	-	-	-
Mov Cap-2 Maneuver	~ 14	-	-	-	-	-
Stage 1	92	-	-	-	-	-
Stage 2	323	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s \$ 1009		1.9		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	249	-	14	83	-	-
HCM Lane V/C Ratio	0.201	-	3.571	0.452	-	-
HCM Control Delay (s)	23.1	\$	1705.6	80.1	-	-
HCM Lane LOS	C	-	F	F	-	-
HCM 95th %tile Q(veh)	0.7	-	7.1	1.9	-	-
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						



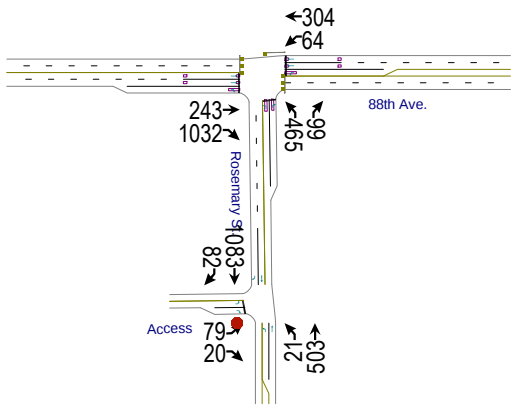
						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↓	↑	↓	↑
Traffic Volume (veh/h)	281	521	88	351	491	99
Future Volume (veh/h)	281	521	88	351	491	99
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	351	0	110	439	614	124
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	406		206	618	991	882
Arrive On Green	0.22	0.00	0.06	0.33	0.56	0.56
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	351	0	110	439	614	124
Grp Sat Flow(s), veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	19.2	0.0	4.9	21.8	24.7	4.0
Cycle Q Clear(g_c), s	19.2	0.0	4.9	21.8	24.7	4.0
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	406		206	618	991	882
V/C Ratio(X)	0.86		0.53	0.71	0.62	0.14
Avail Cap(c_a), veh/h	653		206	864	991	882
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.0	0.0	30.6	31.1	15.9	11.3
Incr Delay (d2), s/veh	7.0	0.0	2.6	1.6	2.9	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.5	0.0	2.3	9.9	10.4	1.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	46.9	0.0	33.3	32.7	18.8	11.7
LnGrp LOS	D		C	C	B	B
Approach Vol, veh/h	351	A		549	738	
Approach Delay, s/veh	46.9			32.8	17.6	
Approach LOS	D			C	B	
Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		65.0	12.0	29.0		41.0
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s		59.0	6.0	37.0		49.0
Max Q Clear Time (g_c+I1), s		26.7	6.9	21.2		23.8
Green Ext Time (p_c), s		2.7	0.0	1.9		2.9
Intersection Summary						
HCM 6th Ctrl Delay			29.0			
HCM 6th LOS			C			

Notes

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Intersection						
Int Delay, s/veh	0.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↱			↑		↱
Traffic Vol, veh/h	749	65	0	842	0	53
Future Vol, veh/h	749	65	0	842	0	53
Conflicting Peds, #/hr	0	0	693	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	936	81	0	1053	0	66
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	-	-	-	509
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.319
Pot Cap-1 Maneuver	-	-	0	-	0	510
Stage 1	-	-	0	-	0	-
Stage 2	-	-	0	-	0	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	-	-	-	510
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0		13.1	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBT		
Capacity (veh/h)	510	-	-	-		
HCM Lane V/C Ratio	0.13	-	-	-		
HCM Control Delay (s)	13.1	-	-	-		
HCM Lane LOS	B	-	-	-		
HCM 95th %tile Q(veh)	0.4	-	-	-		

Intersection						
Int Delay, s/veh	8.9					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	24	19	20	566	594	15
Future Vol, veh/h	24	19	20	566	594	15
Conflicting Peds, #/hr	0	0	401	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	50	100	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	30	24	25	708	743	19
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1901	1144	1163	0	-	0
Stage 1	1144	-	-	-	-	-
Stage 2	757	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	76	243	601	-	-	-
Stage 1	304	-	-	-	-	-
Stage 2	463	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 27	150	371	-	-	-
Mov Cap-2 Maneuver	~ 27	-	-	-	-	-
Stage 1	175	-	-	-	-	-
Stage 2	286	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, s	250.7	0.5		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	371	-	27	150	-	-
HCM Lane V/C Ratio	0.067	-	1.111	0.158	-	-
HCM Control Delay (s)	15.4	-	\$ 422.7	33.5	-	-
HCM Lane LOS	C	-	F	D	-	-
HCM 95th %tile Q(veh)	0.2	-	3.5	0.5	-	-
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

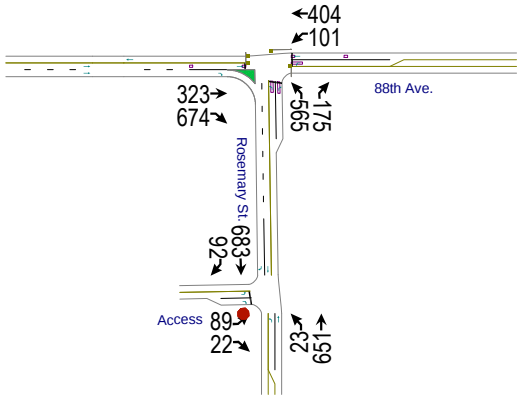


	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↑
Traffic Volume (veh/h)	211	897	56	264	404	86
Future Volume (veh/h)	211	897	56	264	404	86
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	264	0	70	330	505	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	447		260	865	1119	995
Arrive On Green	0.13	0.00	0.05	0.24	0.63	0.63
Sat Flow, veh/h	3647	1585	1781	3647	1781	1585
Grp Volume(v), veh/h	264	0	70	330	505	108
Grp Sat Flow(s), veh/h/ln	1777	1585	1781	1777	1781	1585
Q Serve(g_s), s	4.9	0.0	2.3	5.4	10.3	1.9
Cycle Q Clear(g_c), s	4.9	0.0	2.3	5.4	10.3	1.9
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	447		260	865	1119	995
V/C Ratio(X)	0.59		0.27	0.38	0.45	0.11
Avail Cap(c_a), veh/h	2923		295	3411	1119	995
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.9	0.0	23.2	22.1	6.8	5.2
Incr Delay (d2), s/veh	1.2	0.0	0.6	0.3	1.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.0	0.9	2.2	3.5	0.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	30.1	0.0	23.8	22.3	8.1	5.4
LnGrp LOS	C		C	C	A	A
Approach Vol, veh/h	264	A		400	613	
Approach Delay, s/veh	30.1			22.6	7.6	
Approach LOS	C			C	A	
Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		48.4	8.2	13.3		21.5
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		43.9	5.1	57.5		67.1
Max Q Clear Time (g_c+l1), s		12.3	4.3	6.9		7.4
Green Ext Time (p_c), s		2.1	0.0	1.9		2.4
Intersection Summary						
HCM 6th Ctrl Delay			16.9			
HCM 6th LOS			B			

Notes

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Intersection						
Int Delay, s/veh	95.7					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	69	17	18	437	942	71
Future Vol, veh/h	69	17	18	437	942	71
Conflicting Peds, #/hr	0	0	401	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	50	100	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	86	21	23	546	1178	89
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	2169	1579	1668	0	-	0
Stage 1	1579	-	-	-	-	-
Stage 2	590	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 52	135	385	-	-	-
Stage 1	186	-	-	-	-	-
Stage 2	554	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 18	83	238	-	-	-
Mov Cap-2 Maneuver	~ 18	-	-	-	-	-
Stage 1	104	-	-	-	-	-
Stage 2	342	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, \$ 1725.1		0.9		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	238	-	18	83	-	-
HCM Lane V/C Ratio	0.095	-	4.792	0.256	-	-
HCM Control Delay (s)	21.7	\$ 2134.7	62.7	-	-	-
HCM Lane LOS	C	-	F	F	-	-
HCM 95th %tile Q(veh)	0.3	-	11.4	0.9	-	-
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

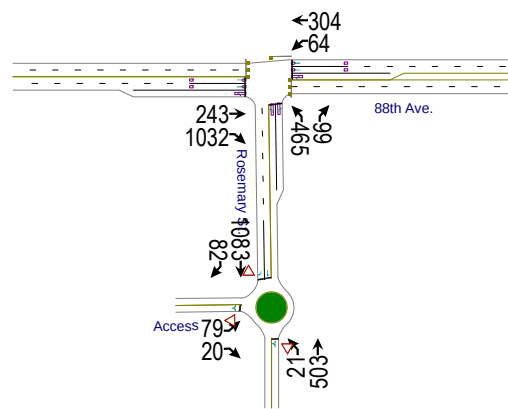


						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	281	586	88	351	491	152
Future Volume (veh/h)	281	586	88	351	491	152
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	351	0	110	439	614	190
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	411		198	611	991	881
Arrive On Green	0.22	0.00	0.05	0.33	0.56	0.56
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	351	0	110	439	614	190
Grp Sat Flow(s),veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	18.5	0.0	4.8	21.2	23.9	6.2
Cycle Q Clear(g_c), s	18.5	0.0	4.8	21.2	23.9	6.2
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	411		198	611	991	881
V/C Ratio(X)	0.85		0.56	0.72	0.62	0.22
Avail Cap(c_a), veh/h	730		198	931	991	881
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.4	0.0	30.0	30.3	15.4	11.5
Incr Delay (d2), s/veh	5.2	0.0	3.4	1.6	2.9	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.9	0.0	2.2	9.6	9.9	2.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	43.6	0.0	33.4	31.9	18.3	12.0
LnGrp LOS	D		C	C	B	B
Approach Vol, veh/h	351	A		549	804	
Approach Delay, s/veh	43.6			32.2	16.8	
Approach LOS	D			C	B	
Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		63.0	11.0	28.5		39.5
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s		57.0	5.0	40.0		51.0
Max Q Clear Time (g_c+I1), s		25.9	6.8	20.5		23.2
Green Ext Time (p_c), s		2.9	0.0	2.0		2.9
Intersection Summary						
HCM 6th Ctrl Delay			27.3			
HCM 6th LOS			C			

Notes

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Intersection						
Int Delay, s/veh	83.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	77	19	20	566	594	80
Future Vol, veh/h	77	19	20	566	594	80
Conflicting Peds, #/hr	0	0	401	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	50	100	-	-	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	96	24	25	708	743	100
Major/Minor	Minor2	Major1		Major2		
Conflicting Flow All	1901	1144	1244	0	-	0
Stage 1	1144	-	-	-	-	-
Stage 2	757	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 76	243	560	-	-	-
Stage 1	304	-	-	-	-	-
Stage 2	463	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 27	150	346	-	-	-
Mov Cap-2 Maneuver	~ 27	-	-	-	-	-
Stage 1	174	-	-	-	-	-
Stage 2	286	-	-	-	-	-
Approach	EB	NB		SB		
HCM Control Delay, \$	1173.7	0.6		0		
HCM LOS	F					
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	346	-	27	150	-	-
HCM Lane V/C Ratio	0.072	-	3.565	0.158	-	-
HCM Control Delay (s)	16.2	-	\$ 1455	33.5	-	-
HCM Lane LOS	C	-	F	D	-	-
HCM 95th %tile Q(veh)	0.2	-	11.7	0.5	-	-
Notes						
~: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon						

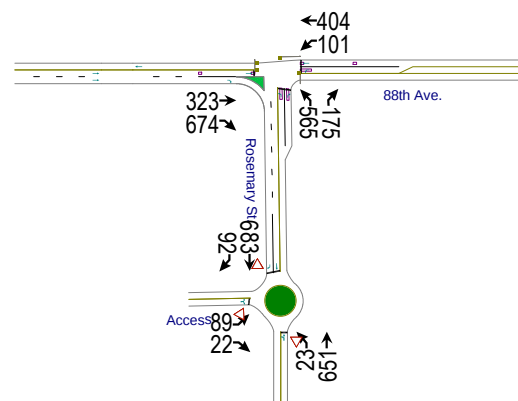


	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↘	↑
Traffic Volume (veh/h)	211	897	56	264	404	86
Future Volume (veh/h)	211	897	56	264	404	86
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	264	0	70	330	505	108
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	441		253	849	1134	1009
Arrive On Green	0.12	0.00	0.05	0.24	0.64	0.64
Sat Flow, veh/h	3647	1585	1781	3647	1781	1585
Grp Volume(v), veh/h	264	0	70	330	505	108
Grp Sat Flow(s), veh/h/ln	1777	1585	1781	1777	1781	1585
Q Serve(g_s), s	5.1	0.0	2.3	5.6	10.4	1.9
Cycle Q Clear(g_c), s	5.1	0.0	2.3	5.6	10.4	1.9
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	441		253	849	1134	1009
V/C Ratio(X)	0.60		0.28	0.39	0.45	0.11
Avail Cap(c_a), veh/h	2735		286	3208	1134	1009
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	29.9	0.0	24.1	23.0	6.7	5.1
Incr Delay (d2), s/veh	1.3	0.0	0.6	0.3	1.3	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	0.0	1.0	2.3	3.5	0.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	31.2	0.0	24.7	23.3	7.9	5.3
LnGrp LOS	C		C	C	A	A
Approach Vol, veh/h	264	A		400	613	
Approach Delay, s/veh	31.2			23.6	7.5	
Approach LOS	C			C	A	
Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		50.4	8.3	13.5		21.7
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s		45.9	5.1	55.5		65.1
Max Q Clear Time (g_c+I1), s		12.4	4.3	7.1		7.6
Green Ext Time (p_c), s		2.1	0.0	1.9		2.4
Intersection Summary						
HCM 6th Ctrl Delay			17.4			
HCM 6th LOS			B			

Notes

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Intersection				
Intersection Delay, s/veh	15.7			
Intersection LOS	C			
Approach	EB	NB	SB	
Entry Lanes	1	1	2	
Conflicting Circle Lanes	1	1	1	
Adj Approach Flow, veh/h	107	569	1267	
Demand Flow Rate, veh/h	109	580	1293	
Vehicles Circulating, veh/h	1202	88	23	
Vehicles Exiting, veh/h	114	1223	645	
Ped Vol Crossing Leg, #/h	401	0	0	
Ped Cap Adj	1.000	1.000	1.000	
Approach Delay, s/veh	13.7	7.7	19.5	
Approach LOS	B	A	C	
Lane	Left	Left	Left	Right
Designated Moves	LR	LT	LT	R
Assumed Moves	LR	LT	LT	R
RT Channelized				
Lane Util	1.000	1.000	0.930	0.070
Follow-Up Headway, s	2.609	2.609	2.535	2.535
Critical Headway, s	4.976	4.976	4.544	4.544
Entry Flow, veh/h	109	580	1202	91
Cap Entry Lane, veh/h	405	1261	1391	1391
Entry HV Adj Factor	0.982	0.981	0.980	0.978
Flow Entry, veh/h	107	569	1178	89
Cap Entry, veh/h	398	1238	1363	1360
V/C Ratio	0.269	0.460	0.864	0.065
Control Delay, s/veh	13.7	7.7	20.7	3.2
LOS	B	A	C	A
95th %tile Queue, veh	1	2	12	0



						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↓	↑	↓	↑
Traffic Volume (veh/h)	281	586	88	351	491	152
Future Volume (veh/h)	281	586	88	351	491	152
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	351	0	110	439	614	190
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	411		198	611	991	881
Arrive On Green	0.22	0.00	0.05	0.33	0.56	0.56
Sat Flow, veh/h	1870	1585	1781	1870	1781	1585
Grp Volume(v), veh/h	351	0	110	439	614	190
Grp Sat Flow(s), veh/h/ln	1870	1585	1781	1870	1781	1585
Q Serve(g_s), s	18.5	0.0	4.8	21.2	23.9	6.2
Cycle Q Clear(g_c), s	18.5	0.0	4.8	21.2	23.9	6.2
Prop In Lane		1.00	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	411		198	611	991	881
V/C Ratio(X)	0.85		0.56	0.72	0.62	0.22
Avail Cap(c_a), veh/h	730		198	931	991	881
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	38.4	0.0	30.0	30.3	15.4	11.5
Incr Delay (d2), s/veh	5.2	0.0	3.4	1.6	2.9	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.9	0.0	2.2	9.6	9.9	2.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	43.6	0.0	33.4	31.9	18.3	12.0
LnGrp LOS	D		C	C	B	B
Approach Vol, veh/h	351	A		549	804	
Approach Delay, s/veh	43.6			32.2	16.8	
Approach LOS	D			C	B	
Timer - Assigned Phs		2	3	4		8
Phs Duration (G+Y+Rc), s		63.0	11.0	28.5		39.5
Change Period (Y+Rc), s		6.0	6.0	6.0		6.0
Max Green Setting (Gmax), s		57.0	5.0	40.0		51.0
Max Q Clear Time (g_c+I1), s		25.9	6.8	20.5		23.2
Green Ext Time (p_c), s		2.9	0.0	2.0		2.9
Intersection Summary						
HCM 6th Ctrl Delay			27.3			
HCM 6th LOS			C			

Notes

Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.

Intersection				
Intersection Delay, s/veh	9.0			
Intersection LOS	A			
Approach	EB	NB	SB	
Entry Lanes	1	1	2	
Conflicting Circle Lanes	1	1	1	
Adj Approach Flow, veh/h	120	733	843	
Demand Flow Rate, veh/h	122	748	860	
Vehicles Circulating, veh/h	758	98	25	
Vehicles Exiting, veh/h	127	782	820	
Ped Vol Crossing Leg, #/h	401	0	0	
Ped Cap Adj	0.945	1.000	1.000	
Approach Delay, s/veh	8.6	10.2	7.9	
Approach LOS	A	B	A	
Lane	Left	Left	Left	Right
Designated Moves	LR	LT	LT	R
Assumed Moves	LR	LT	LT	R
RT Channelized				
Lane Util	1.000	1.000	0.881	0.119
Follow-Up Headway, s	2.609	2.609	2.535	2.535
Critical Headway, s	4.976	4.976	4.544	4.544
Entry Flow, veh/h	122	748	758	102
Cap Entry Lane, veh/h	637	1249	1388	1388
Entry HV Adj Factor	0.984	0.980	0.980	0.980
Flow Entry, veh/h	120	733	743	100
Cap Entry, veh/h	592	1223	1361	1361
V/C Ratio	0.203	0.599	0.546	0.073
Control Delay, s/veh	8.6	10.2	8.5	3.2
LOS	A	B	A	A
95th %tile Queue, veh	1	4	3	0



(303) 216-2439
www.alltrafficdata.net

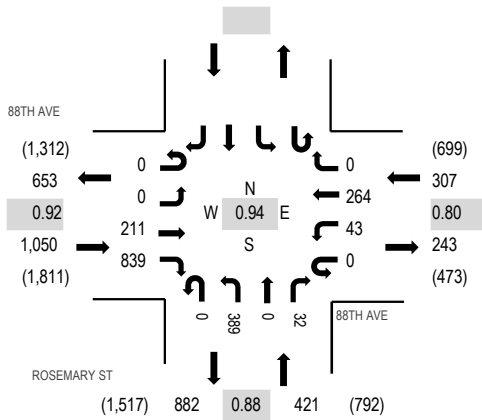
Location: 1 ROSEMARY ST & 88TH AVE AM

Date: Tuesday, September 11, 2018

Peak Hour: 07:00 AM - 08:00 AM

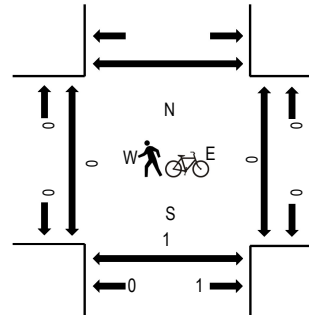
Peak 15-Minutes: 07:30 AM - 07:45 AM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	88TH AVE Eastbound				88TH AVE Westbound				ROSEMARY ST Northbound				Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
7:00 AM	0	0	47	216	0	6	58	0	0	84	0	9					420	1,778	0	0	0	
7:15 AM	0	0	63	222	0	11	64	0	0	89	0	8					457	1,705	0	0	0	
7:30 AM	0	0	50	221	0	11	80	0	0	100	0	10					472	1,727	0	0	0	
7:45 AM	0	0	51	180	0	15	62	0	0	116	0	5					429	1,606	0	0	1	
8:00 AM	0	0	36	149	0	25	56	0	0	72	0	9					347	1,524	0	0	0	
8:15 AM	0	0	59	175	0	19	103	0	0	111	0	12					479		0	0	0	
8:30 AM	0	0	49	135	0	9	93	0	0	56	0	9					351		0	0	0	
8:45 AM	0	0	44	114	0	9	78	0	0	90	0	12					347		0	0	1	
Count Total	0	0	399	1,412	0	105	594	0	0	718	0	74					3,302		0	0	2	
Peak Hour	0	0	211	839	0	43	264	0	0	389	0	32					1,778		0	0	1	



(303) 216-2439
www.alltrafficdata.net

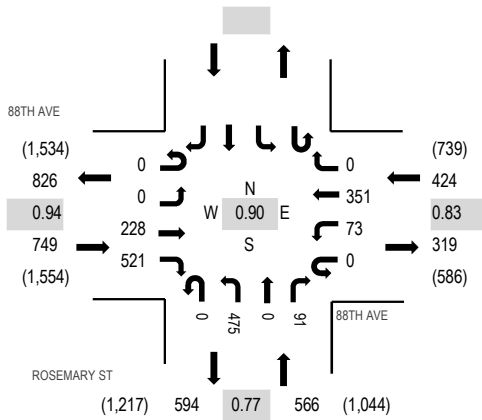
Location: 1 ROSEMARY ST & 88TH AVE PM

Date: Tuesday, September 11, 2018

Peak Hour: 04:00 PM - 05:00 PM

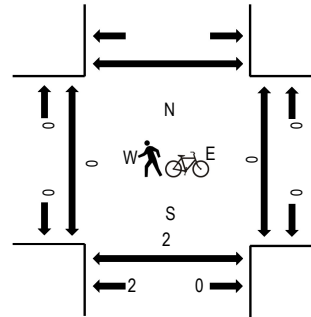
Peak 15-Minutes: 04:30 PM - 04:45 PM

Peak Hour - All Vehicles



Note: Total study counts contained in parentheses.

Peak Hour - Pedestrians/Bicycles on Crosswalk



Traffic Counts

Interval Start Time	88TH AVE Eastbound				88TH AVE Westbound				ROSEMARY ST Northbound				Southbound				Total	Rolling Hour	Pedestrian Crossings			
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right			West	East	South	North
4:00 PM	0	0	63	135	0	13	74	0	0	153	0	9					447	1,739	0	0	0	0
4:15 PM	0	0	58	139	0	26	100	0	0	20	0	57					400	1,698	0	0	0	0
4:30 PM	0	0	48	122	0	21	109	0	0	168	0	16					484	1,692	0	0	2	2
4:45 PM	0	0	59	125	0	13	68	0	0	134	0	9					408	1,600	0	0	0	0
5:00 PM	0	0	53	142	3	16	76	0	0	111	0	5					406	1,598	0	0	0	0
5:15 PM	0	0	59	140	2	10	63	0	0	112	0	8					394		0	0	0	0
5:30 PM	0	0	71	144	3	13	53	0	0	106	0	2					392		0	0	0	0
5:45 PM	0	0	51	145	1	13	62	0	0	125	0	9					406		0	0	0	0
Count Total	0	0	462	1,092	9	125	605	0	0	929	0	115					3,337		0	0	2	2
Peak Hour	0	0	228	521	0	73	351	0	0	475	0	91					1,739		0	0	2	2