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June 12, 2017 Project #: 20703

Brett Kelver, AICP and Alex Roller, EI
City of Milwaukie
10722 SE Main Street
Milwaukie, OR 97222

RE: Kellogg Creek Townhomes Supplemental Traffic Operational Analysis Information

Dear Mr. Kelver and Mr. Roller,

This letter addresses comments raised at the May 23 and May 25, 2017 Planning Commission hearings that questioned two aspects of the February 7, 2017 Traffic Impact Study (TIS) report. To address the comments, the Commission and the City of Milwaukie have asked us to respond to the two points below:

1. The traffic study collected weekday AM and PM peak period traffic counts at the three following intersections on Wednesday, November 2, 2016; on that day, classes at the North Clackamas School District were not in session:
    a. OR 224/SE Rusk Road
    b. SE Rusk Road/SE Ruscliffe Road
    c. SE Rusk Rd/SE Kellogg Creek Drive
2. The northbound approach of SE Rusk Road at the intersection of OR 224/SE Rusk Road was analyzed with a shared left-through lane and a right-turn lane.

To address these comments, we have been asked to:

- Collect weekday AM and PM peak period traffic counts at the three intersections on a day when school is in session.
- Complete an AM and PM peak hour analysis for the three intersections for the existing, background, and total traffic scenarios and determine if operating standards are met.
- Complete an AM and PM peak hour analysis for the proposed site driveway.
- Analyze the northbound approach of SE Rusk Road at the intersection of OR 224/SE Rusk Road as a single lane.

As described above, this letter provides supplemental traffic analysis results that address each of the requested items, and finds that the three study intersections and the site driveway would operate acceptably in the future with site development.

TRAFFIC IMPACT ANALYSIS

New turning movements counts were collected at the three intersections during the weekday AM and PM peak periods on Thursday, June 1, 2017, when school was in session (in addition, seasonal activities at North Clackamas Park on SE Kellogg Drive were also active). The weekday AM and PM hour volumes are shown in Figure 1 and Figure 2, respectively, alongside the volumes (collected in November 2016) from the February 2017 traffic report.

The northbound approach on SE Rusk Road at the intersection of OR 224/SE Rusk Road was modeled with a single shared left-through-right lane per City staff's request.

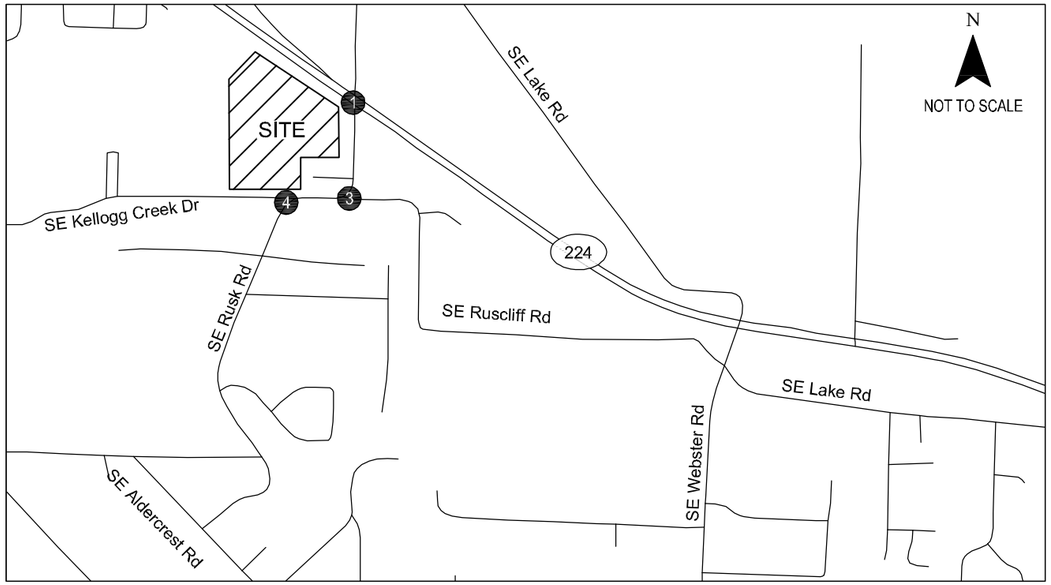
The operational analysis was conducted for the weekday AM and PM peak hours for existing conditions, background, and total traffic with the new traffic volumes and lane configuration on SE Rusk Road. The results for the weekday AM and PM peak hours are shown in Figure 1 and Figure 2, respectively, alongside the results from the February 2017 traffic report. The applicable operating standards and results are shown below in Table 1.

As the results indicate, all three intersections and the site driveway would meet the respective operational standards under the total traffic conditions for both the weekday AM and PM peak hours. Given that the intersections operate acceptably under total traffic conditions with site-generated trips, they will also operate acceptably under existing and background traffic conditions without the site-generated trips.

Table 1. June 1, 2017 Operational Results and Comparison to Previous

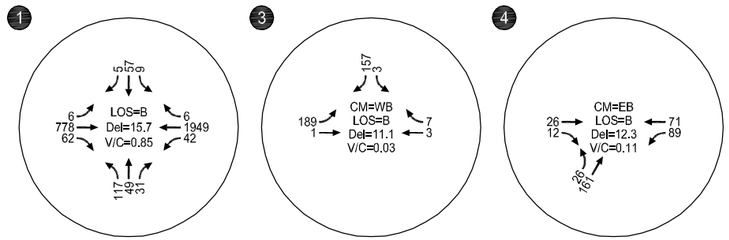
Intersection	Jurisdiction	Applicable Peak Hour Operating Standards	Previous Total Traffic Results		June 1, 2017 Total Traffic Results		Mets Standard?
			AM Peak	PM Peak	AM Peak	PM Peak	
#1 OR-224/SE Rusk Road	ODOT	Intersection V/C ≤ 0.99	0.88	0.86	0.95	0.93	Yes
#3 SE Rusk Road/SE Ruscliffe Road	City of Milwaukie & Clackamas County	LOS "D" & PM V/C ≤ 0.99	LOS "B"	LOS "B" 0.01	LOS "B"	LOS "B" 0.09	Yes
#4 SE Rusk Road/SE Kellogg Creek Drive	City of Milwaukie & Clackamas County	LOS "D" & PM V/C ≤ 0.99	LOS "B"	LOS "B" 0.23	LOS "B"	LOS "B"* 0.17*	Yes
#5 SE Kellogg Creek Drive/Site Driveway	City of Milwaukie	LOS "D"	LOS "B"	LOS "A"	LOS "B"	LOS "A"	Yes

* Note that on June 1, 2017, the volume of eastbound traffic on SE Kellogg Creek was lower than on the previous count day in November 2016 (per the February 2017 traffic report). Using the higher count from November 2016, the results for the weekday PM peak hour would be LOS "C" (16.1 seconds of per-vehicle delay) and a v/c ratio of 0.28. Both the November 2016 and June 2017 results are well within the respective operating standard.

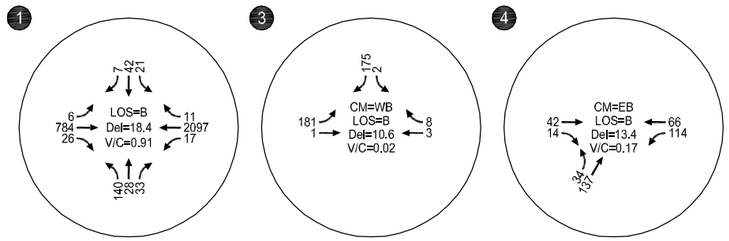


EXISTING

NOVEMBER 2016
VOLUMES & RESULTS

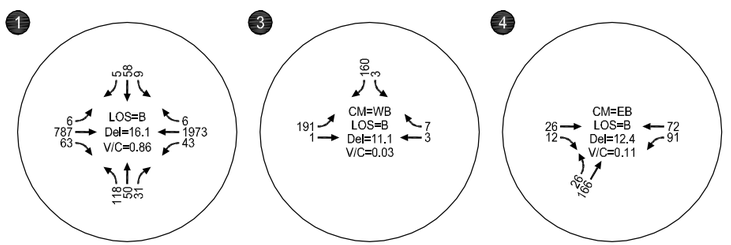


JUNE 2017
VOLUMES & RESULTS

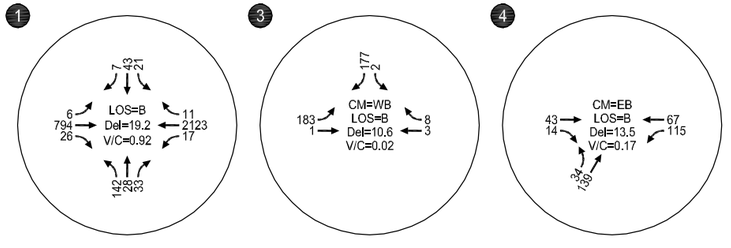


2018 BACKGROUND

NOVEMBER 2016
VOLUMES & RESULTS

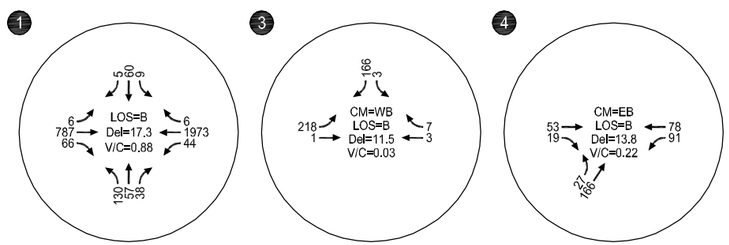


JUNE 2017
VOLUMES & RESULTS

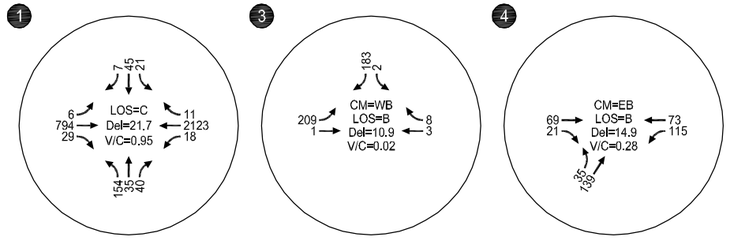


2018 TOTAL

NOVEMBER 2016
VOLUMES & RESULTS



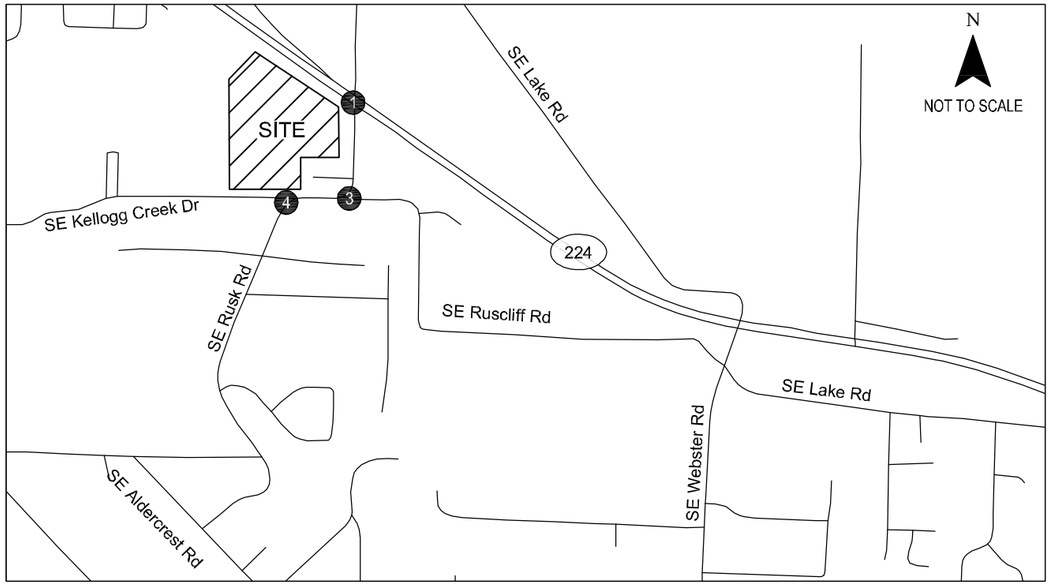
JUNE 2017
VOLUMES & RESULTS



CM = CRITICAL MOVEMENT (TWSC)
LOS = INTERSECTION LEVEL OF SERVICE (SIGNALIZED/AWSC) / CRITICAL MOVEMENT LEVEL OF SERVICE (TWSC)
Del = INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED/AWSC) / CRITICAL MOVEMENT CONTROL DELAY (TWSC)
V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

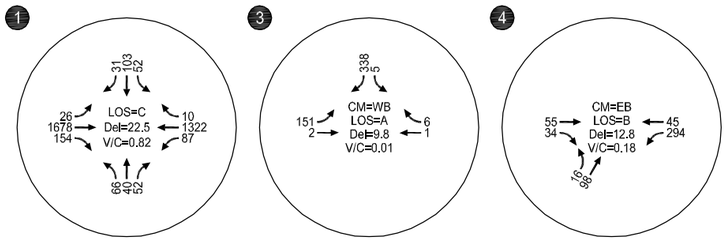
Existing, 2018 Background, and 2018 Total Traffic Conditions
AM Peak Hour
Milwaukie, Oregon

Figure
1

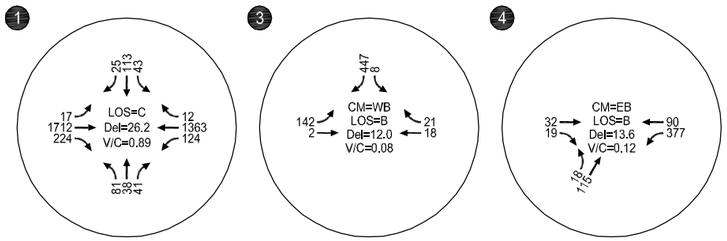


EXISTING

NOVEMBER 2016 VOLUMES & RESULTS

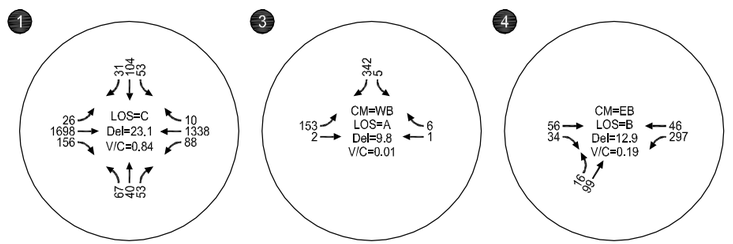


JUNE 2017 VOLUMES & RESULTS

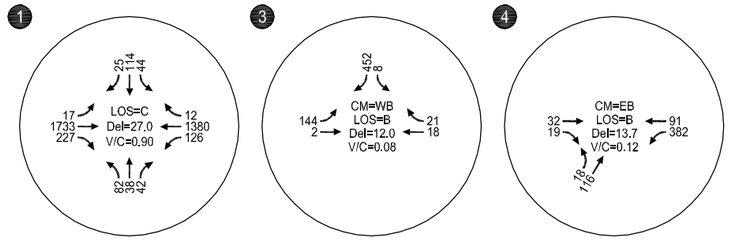


2018 BACKGROUND

NOVEMBER 2016 VOLUMES & RESULTS

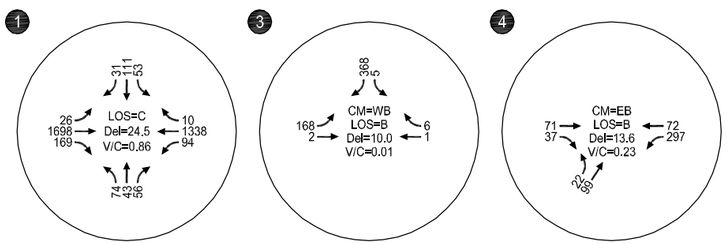


JUNE 2017 VOLUMES & RESULTS

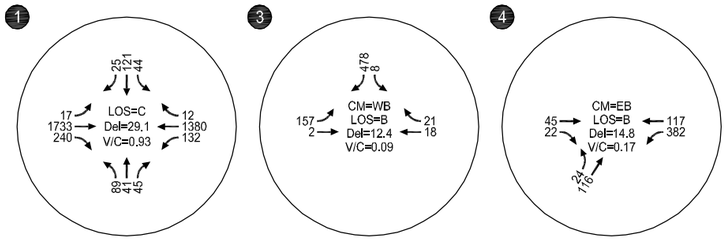


2018 TOTAL

NOVEMBER 2016 VOLUMES & RESULTS



JUNE 2017 VOLUMES & RESULTS



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V/C = CRITICAL VOLUME-TO-CAPACITY RATIO

Existing, 2018 Background, and 2018 Total Traffic Conditions
PM Peak Hour
Milwaukie, Oregon

Figure 2

SUMMARY

In summary, while there is an incremental increase in delay at each of the three study intersections due to the higher volume of weekday AM and PM peak hour trips (and the lane configuration modification on SE Rusk Road at OR 224), the intersections all would continue to operate acceptably during both of the respective analysis periods. Further, it is noted that the operations analysis presented in Figure 1 and Figure 2 are consistent with the assumptions of the TIS, including the use of existing ODOT signal timing at the OR 224/SE Rusk Road intersection. Given the staff-recommended condition of approval to provide a northbound right-turn lane on SE Rusk Road at OR 224, we would expect the OR 224/SE Rusk Road intersection operations to perform better than those presented in the TIS or this letter. The analysis worksheets are attached to this letter for your reference.

NEXT STEPS

No additional transportation mitigation needs were identified through this supplemental analysis. We believe the analysis findings presented in this letter and the February 7, 2017 Traffic Impact Study provide the City, ODOT, and Clackamas County with sufficient information to understand the traffic impacts of the proposed development. Please let us know if you have any questions about the materials presented.

Sincerely,
KITTELSON & ASSOCIATES, INC.

Zachary Horowitz
Senior Project Manager

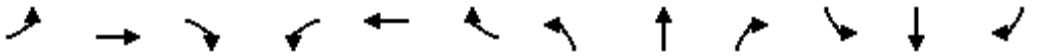
Chris Brehmer, P.E.
Principal Engineer

Attachment: June 1, 2017 Operations Analysis Worksheets

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	6	825	27	18	2207	12	211	66	7
v/c Ratio	0.07	0.35	0.03	0.18	0.89	0.01	0.90	0.26	0.03
Control Delay	55.5	8.4	0.0	50.5	13.7	0.5	84.4	45.3	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.5	8.4	0.0	50.5	13.7	0.5	84.4	45.3	0.1
Queue Length 50th (ft)	5	103	0	14	312	0	155	44	0
Queue Length 95th (ft)	19	193	0	m18	m#1044	m0	#294	88	0
Internal Link Dist (ft)		263			2471		389	744	
Turn Bay Length (ft)	470		110	455		100			75
Base Capacity (vph)	165	2367	1051	315	2488	872	246	263	288
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.35	0.03	0.06	0.89	0.01	0.86	0.25	0.02

Intersection Summary

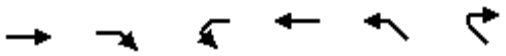
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	784	26	17	2097	11	140	28	33	21	42	7
Future Volume (vph)	6	784	26	17	2097	11	140	28	33	21	42	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0		4.0			4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	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	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.98	1.00
Satd. Flow (prot)	1805	3374	1463	1805	3438	1188		1693			1588	1129
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.75			0.89	1.00
Satd. Flow (perm)	1805	3374	1463	1805	3438	1188		1316			1438	1129
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)	6	825	27	18	2207	12	147	29	35	22	44	7
RTOR Reduction (vph)	0	0	9	0	0	4	0	6	0	0	0	6
Lane Group Flow (vph)	6	825	18	18	2207	8	0	205	0	0	66	1
Confl. Peds. (#/hr)			1				1					
Heavy Vehicles (%)	0%	7%	8%	0%	5%	36%	5%	11%	6%	29%	12%	43%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	1.4	81.8	81.8	3.2	83.6	83.6		21.0			21.0	21.0
Effective Green, g (s)	1.4	81.8	81.8	3.2	83.6	83.6		21.0			21.0	21.0
Actuated g/C Ratio	0.01	0.68	0.68	0.03	0.70	0.70		0.18			0.18	0.18
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	21	2299	997	48	2395	827		230			251	197
v/s Ratio Prot	0.00	0.24		c0.01	c0.64							
v/s Ratio Perm			0.01			0.01		c0.16			0.05	0.00
v/c Ratio	0.29	0.36	0.02	0.38	0.92	0.01		0.89			0.26	0.01
Uniform Delay, d1	58.8	8.0	6.2	57.4	15.4	5.6		48.4			42.8	40.9
Progression Factor	1.00	1.00	1.00	0.91	0.72	1.00		1.00			1.00	1.00
Incremental Delay, d2	7.4	0.4	0.0	2.5	4.1	0.0		32.1			0.6	0.0
Delay (s)	66.2	8.5	6.2	54.6	15.2	5.6		80.5			43.4	40.9
Level of Service	E	A	A	D	B	A		F			D	D
Approach Delay (s)		8.8			15.4			80.5			43.1	
Approach LOS		A			B			F			D	

Intersection Summary			
HCM 2000 Control Delay	18.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		

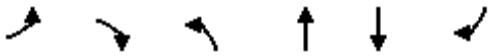
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	181	1	2	175	3	8
Future Volume (Veh/h)	181	1	2	175	3	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Hourly flow rate (vph)	248	1	3	240	4	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				553		
pX, platoon unblocked						
vC, conflicting volume			249		494	248
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			249		494	248
tC, single (s)			4.1		6.7	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.8	3.4
p0 queue free %			100		99	99
cM capacity (veh/h)			1328		482	764

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	249	243	15
Volume Left	0	3	4
Volume Right	1	0	11
cSH	1700	1328	661
Volume to Capacity	0.15	0.00	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.0	0.1	10.6
Lane LOS		A	B
Approach Delay (s)	0.0	0.1	10.6
Approach LOS			B

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	20.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	42	14	34	137	114	66
Future Volume (Veh/h)	42	14	34	137	114	66
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.64	0.64	0.64	0.64	0.64	0.64
Hourly flow rate (vph)	66	22	53	214	178	103
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					923	
pX, platoon unblocked						
vC, conflicting volume	550	230	281			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	550	230	281			
tC, single (s)	6.5	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.4	2.2			
p0 queue free %	86	97	96			
cM capacity (veh/h)	463	797	1276			

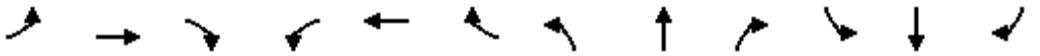
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	88	267	281
Volume Left	66	53	0
Volume Right	22	0	103
cSH	517	1276	1700
Volume to Capacity	0.17	0.04	0.17
Queue Length 95th (ft)	15	3	0
Control Delay (s)	13.4	1.9	0.0
Lane LOS	B	A	
Approach Delay (s)	13.4	1.9	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	32.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	18	1861	243	135	1482	13	174	170	27
v/c Ratio	0.19	0.90	0.25	0.74	0.61	0.01	0.96	0.61	0.08
Control Delay	57.6	29.3	8.2	70.8	11.8	0.8	101.5	53.8	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.6	29.3	8.2	70.8	11.8	0.8	101.5	53.8	0.5
Queue Length 50th (ft)	14	682	53	90	357	0	124	121	0
Queue Length 95th (ft)	38	#891	98	m#200	m580	m0	#237	187	2
Internal Link Dist (ft)		263			2471		389	767	
Turn Bay Length (ft)	470		110	455		100			75
Base Capacity (vph)	156	2067	982	184	2443	1139	224	352	385
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.90	0.25	0.73	0.61	0.01	0.78	0.48	0.07

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	1712	224	124	1363	12	81	38	41	43	113	25
Future Volume (vph)	17	1712	224	124	1363	12	81	38	41	43	113	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0		4.0			4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.97	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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.99	1.00
Satd. Flow (prot)	1703	3438	1573	1770	3505	1615		1735			1816	1495
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.53			0.85	1.00
Satd. Flow (perm)	1703	3438	1573	1770	3505	1615		950			1567	1495
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	1861	243	135	1482	13	88	41	45	47	123	27
RTOR Reduction (vph)	0	0	37	0	0	4	0	11	0	0	0	22
Lane Group Flow (vph)	18	1861	206	135	1482	9	0	163	0	0	170	5
Confl. Peds. (#/hr)			3				3					
Heavy Vehicles (%)	6%	5%	0%	2%	3%	0%	1%	5%	5%	9%	1%	8%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	3.3	72.1	72.1	12.4	81.2	81.2		21.5			21.5	21.5
Effective Green, g (s)	3.3	72.1	72.1	12.4	81.2	81.2		21.5			21.5	21.5
Actuated g/C Ratio	0.03	0.60	0.60	0.10	0.68	0.68		0.18			0.18	0.18
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	46	2065	945	182	2371	1092		170			280	267
v/s Ratio Prot	0.01	c0.54		c0.08	0.42							
v/s Ratio Perm			0.13			0.01		c0.17			0.11	0.00
v/c Ratio	0.39	0.90	0.22	0.74	0.63	0.01		0.96			0.61	0.02
Uniform Delay, d1	57.4	20.8	11.0	52.2	10.9	6.3		48.8			45.4	40.6
Progression Factor	1.00	1.00	1.00	0.95	0.93	1.00		1.00			1.00	1.00
Incremental Delay, d2	5.4	6.9	0.5	12.7	1.0	0.0		55.6			3.7	0.0
Delay (s)	62.8	27.7	11.5	62.4	11.1	6.3		104.4			49.1	40.6
Level of Service	E	C	B	E	B	A		F			D	D
Approach Delay (s)		26.2			15.3			104.4			47.9	
Approach LOS		C			B			F			D	

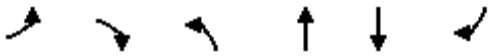
Intersection Summary			
HCM 2000 Control Delay	26.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	81.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	18	21	142	2	8	447
Future Volume (Veh/h)	18	21	142	2	8	447
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	21	25	169	2	10	532
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						553
pX, platoon unblocked						
vC, conflicting volume	722	170			171	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	722	170			171	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	97			99	
cM capacity (veh/h)	394	879			1418	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	46	171	542
Volume Left	21	0	10
Volume Right	25	2	0
cSH	563	1700	1418
Volume to Capacity	0.08	0.10	0.01
Queue Length 95th (ft)	7	0	1
Control Delay (s)	12.0	0.0	0.2
Lane LOS	B		A
Approach Delay (s)	12.0	0.0	0.2
Approach LOS	B		

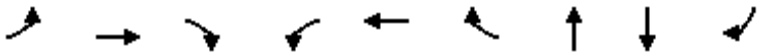
Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	39.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	32	19	18	115	377	90
Future Volume (Veh/h)	32	19	18	115	377	90
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	36	22	20	131	428	102
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					920	
pX, platoon unblocked						
vC, conflicting volume	650	479	530			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	650	479	530			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	92	96	98			
cM capacity (veh/h)	424	591	1048			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	58	151	530
Volume Left	36	20	0
Volume Right	22	0	102
cSH	475	1048	1700
Volume to Capacity	0.12	0.02	0.31
Queue Length 95th (ft)	10	1	0
Control Delay (s)	13.6	1.3	0.0
Lane LOS	B	A	
Approach Delay (s)	13.6	1.3	0.0
Approach LOS	B		

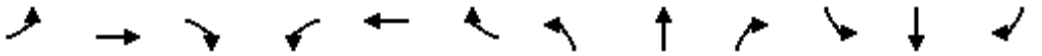
Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	35.3%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	6	836	27	18	2235	12	213	67	7
v/c Ratio	0.07	0.35	0.03	0.18	0.90	0.01	0.90	0.27	0.03
Control Delay	55.5	8.5	0.0	50.5	14.4	0.5	85.5	45.4	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.5	8.5	0.0	50.5	14.4	0.5	85.5	45.4	0.1
Queue Length 50th (ft)	5	105	0	14	317	0	157	45	0
Queue Length 95th (ft)	19	197	0	m17	m#1068	m0	#298	89	0
Internal Link Dist (ft)		263			2471		389	744	
Turn Bay Length (ft)	470		110	455		100			75
Base Capacity (vph)	165	2366	1050	315	2486	871	246	264	288
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.35	0.03	0.06	0.90	0.01	0.87	0.25	0.02

Intersection Summary

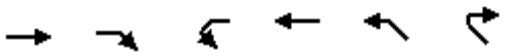
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	794	26	17	2123	11	142	28	33	21	43	7
Future Volume (vph)	6	794	26	17	2123	11	142	28	33	21	43	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0		4.0			4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	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	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.98	1.00
Satd. Flow (prot)	1805	3374	1463	1805	3438	1188		1693			1590	1129
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.75			0.89	1.00
Satd. Flow (perm)	1805	3374	1463	1805	3438	1188		1314			1442	1129
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)	6	836	27	18	2235	12	149	29	35	22	45	7
RTOR Reduction (vph)	0	0	9	0	0	4	0	6	0	0	0	6
Lane Group Flow (vph)	6	836	18	18	2235	8	0	207	0	0	67	1
Confl. Peds. (#/hr)			1				1					
Heavy Vehicles (%)	0%	7%	8%	0%	5%	36%	5%	11%	6%	29%	12%	43%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	1.4	81.8	81.8	3.2	83.6	83.6		21.0			21.0	21.0
Effective Green, g (s)	1.4	81.8	81.8	3.2	83.6	83.6		21.0			21.0	21.0
Actuated g/C Ratio	0.01	0.68	0.68	0.03	0.70	0.70		0.18			0.18	0.18
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	21	2299	997	48	2395	827		229			252	197
v/s Ratio Prot	0.00	0.25		c0.01	c0.65							
v/s Ratio Perm			0.01			0.01		c0.16			0.05	0.00
v/c Ratio	0.29	0.36	0.02	0.38	0.93	0.01		0.90			0.27	0.01
Uniform Delay, d1	58.8	8.1	6.2	57.4	15.8	5.6		48.5			42.8	40.9
Progression Factor	1.00	1.00	1.00	0.91	0.72	1.00		1.00			1.00	1.00
Incremental Delay, d2	7.4	0.4	0.0	2.6	4.8	0.0		34.7			0.6	0.0
Delay (s)	66.2	8.5	6.2	54.6	16.2	5.6		83.2			43.4	40.9
Level of Service	E	A	A	D	B	A		F			D	D
Approach Delay (s)		8.9			16.4			83.2			43.2	
Approach LOS		A			B			F			D	

Intersection Summary			
HCM 2000 Control Delay	19.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	86.7%	ICU Level of Service	E
Analysis Period (min)	15		

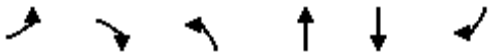
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	183	1	2	177	3	8
Future Volume (Veh/h)	183	1	2	177	3	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Hourly flow rate (vph)	251	1	3	242	4	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				553		
pX, platoon unblocked						
vC, conflicting volume			252		500	252
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			252		500	252
tC, single (s)			4.1		6.7	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.8	3.4
p0 queue free %			100		99	99
cM capacity (veh/h)			1325		478	761

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	252	245	15
Volume Left	0	3	4
Volume Right	1	0	11
cSH	1700	1325	657
Volume to Capacity	0.15	0.00	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.0	0.1	10.6
Lane LOS		A	B
Approach Delay (s)	0.0	0.1	10.6
Approach LOS			B

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	20.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	43	14	34	139	115	67
Future Volume (Veh/h)	43	14	34	139	115	67
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.64	0.64	0.64	0.64	0.64	0.64
Hourly flow rate (vph)	67	22	53	217	180	105
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					923	
pX, platoon unblocked						
vC, conflicting volume	556	232	285			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	556	232	285			
tC, single (s)	6.5	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.4	2.2			
p0 queue free %	85	97	96			
cM capacity (veh/h)	459	794	1271			

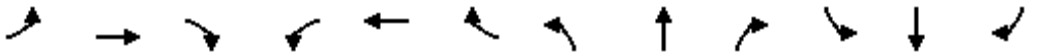
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	89	270	285
Volume Left	67	53	0
Volume Right	22	0	105
cSH	513	1271	1700
Volume to Capacity	0.17	0.04	0.17
Queue Length 95th (ft)	16	3	0
Control Delay (s)	13.5	1.9	0.0
Lane LOS	B	A	
Approach Delay (s)	13.5	1.9	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	32.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	18	1884	247	137	1500	13	176	172	27
v/c Ratio	0.19	0.91	0.25	0.76	0.62	0.01	0.96	0.61	0.08
Control Delay	57.6	30.8	8.3	73.0	12.1	0.8	100.0	53.4	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.6	30.8	8.3	73.0	12.1	0.8	100.0	53.4	0.5
Queue Length 50th (ft)	14	701	55	93	366	0	125	122	0
Queue Length 95th (ft)	38	#911	101	m#205	m590	m0	#240	189	2
Internal Link Dist (ft)		263			2471		389	767	
Turn Bay Length (ft)	470		110	455		100			75
Base Capacity (vph)	156	2060	979	181	2432	1134	224	351	385
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.91	0.25	0.76	0.62	0.01	0.79	0.49	0.07

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	1733	227	126	1380	12	82	38	42	44	114	25
Future Volume (vph)	17	1733	227	126	1380	12	82	38	42	44	114	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0		4.0			4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.97	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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.96			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.99	1.00
Satd. Flow (prot)	1703	3438	1573	1770	3505	1615		1735			1815	1495
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.53			0.85	1.00
Satd. Flow (perm)	1703	3438	1573	1770	3505	1615		950			1563	1495
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	1884	247	137	1500	13	89	41	46	48	124	27
RTOR Reduction (vph)	0	0	37	0	0	4	0	11	0	0	0	22
Lane Group Flow (vph)	18	1884	210	137	1500	9	0	165	0	0	172	5
Confl. Peds. (#/hr)			3				3					
Heavy Vehicles (%)	6%	5%	0%	2%	3%	0%	1%	5%	5%	9%	1%	8%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	3.3	71.9	71.9	12.2	80.8	80.8		21.9			21.9	21.9
Effective Green, g (s)	3.3	71.9	71.9	12.2	80.8	80.8		21.9			21.9	21.9
Actuated g/C Ratio	0.03	0.60	0.60	0.10	0.67	0.67		0.18			0.18	0.18
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	46	2059	942	179	2360	1087		173			285	272
v/s Ratio Prot	0.01	c0.55		c0.08	0.43							
v/s Ratio Perm			0.13			0.01		c0.17			0.11	0.00
v/c Ratio	0.39	0.92	0.22	0.77	0.64	0.01		0.95			0.60	0.02
Uniform Delay, d1	57.4	21.3	11.1	52.5	11.2	6.4		48.5			45.1	40.2
Progression Factor	1.00	1.00	1.00	0.95	0.92	1.00		1.00			1.00	1.00
Incremental Delay, d2	5.4	7.8	0.5	15.0	1.1	0.0		54.0			3.6	0.0
Delay (s)	62.8	29.2	11.7	65.1	11.4	6.4		102.5			48.6	40.3
Level of Service	E	C	B	E	B	A		F			D	D
Approach Delay (s)		27.4			15.8			102.5			47.5	
Approach LOS		C			B			F			D	

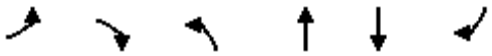
Intersection Summary			
HCM 2000 Control Delay	27.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	18	21	144	2	8	452
Future Volume (Veh/h)	18	21	144	2	8	452
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	21	25	171	2	10	538
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						553
pX, platoon unblocked						
vC, conflicting volume	730	172			173	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	730	172			173	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	97			99	
cM capacity (veh/h)	390	877			1416	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	46	173	548
Volume Left	21	0	10
Volume Right	25	2	0
cSH	558	1700	1416
Volume to Capacity	0.08	0.10	0.01
Queue Length 95th (ft)	7	0	1
Control Delay (s)	12.0	0.0	0.2
Lane LOS	B		A
Approach Delay (s)	12.0	0.0	0.2
Approach LOS	B		

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	40.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	32	19	18	116	382	91
Future Volume (Veh/h)	32	19	18	116	382	91
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	36	22	20	132	434	103
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					920	
pX, platoon unblocked						
vC, conflicting volume	658	486	537			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	658	486	537			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	91	96	98			
cM capacity (veh/h)	420	586	1041			

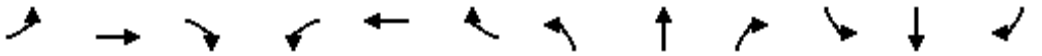
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	58	152	537
Volume Left	36	20	0
Volume Right	22	0	103
cSH	470	1041	1700
Volume to Capacity	0.12	0.02	0.32
Queue Length 95th (ft)	10	1	0
Control Delay (s)	13.7	1.3	0.0
Lane LOS	B	A	
Approach Delay (s)	13.7	1.3	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	35.6%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	6	836	31	19	2235	12	241	69	7
v/c Ratio	0.07	0.36	0.03	0.19	0.91	0.01	0.97	0.26	0.02
Control Delay	55.5	8.7	0.1	50.8	15.0	0.5	98.0	45.1	0.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	55.5	8.7	0.1	50.8	15.0	0.5	98.0	45.1	0.1
Queue Length 50th (ft)	5	105	0	15	317	0	182	46	0
Queue Length 95th (ft)	19	197	0	m18	m#1068	m0	#350	91	0
Internal Link Dist (ft)		263			2471		389	744	
Turn Bay Length (ft)	470		110	455		100			75
Base Capacity (vph)	165	2338	1038	315	2458	862	248	264	288
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.04	0.36	0.03	0.06	0.91	0.01	0.97	0.26	0.02

Intersection Summary

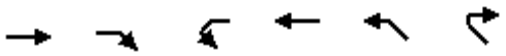
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	794	29	18	2123	11	154	35	40	21	45	7
Future Volume (vph)	6	794	29	18	2123	11	154	35	40	21	45	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0		4.0			4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	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	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.98			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97			0.98	1.00
Satd. Flow (prot)	1805	3374	1463	1805	3438	1188		1691			1593	1129
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.76			0.89	1.00
Satd. Flow (perm)	1805	3374	1463	1805	3438	1188		1321			1440	1129
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)	6	836	31	19	2235	12	162	37	42	22	47	7
RTOR Reduction (vph)	0	0	10	0	0	4	0	7	0	0	0	6
Lane Group Flow (vph)	6	836	21	19	2235	8	0	234	0	0	69	1
Confl. Peds. (#/hr)			1				1					
Heavy Vehicles (%)	0%	7%	8%	0%	5%	36%	5%	11%	6%	29%	12%	43%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	1.4	80.8	80.8	3.2	82.6	82.6		22.0			22.0	22.0
Effective Green, g (s)	1.4	80.8	80.8	3.2	82.6	82.6		22.0			22.0	22.0
Actuated g/C Ratio	0.01	0.67	0.67	0.03	0.69	0.69		0.18			0.18	0.18
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	21	2271	985	48	2366	817		242			264	206
v/s Ratio Prot	0.00	0.25		c0.01	c0.65							
v/s Ratio Perm			0.01			0.01		c0.18			0.05	0.00
v/c Ratio	0.29	0.37	0.02	0.40	0.94	0.01		0.97			0.26	0.01
Uniform Delay, d1	58.8	8.5	6.5	57.4	16.7	5.9		48.7			42.0	40.1
Progression Factor	1.00	1.00	1.00	0.91	0.72	1.00		1.00			1.00	1.00
Incremental Delay, d2	7.4	0.5	0.0	2.8	5.6	0.0		48.5			0.5	0.0
Delay (s)	66.2	9.0	6.5	55.1	17.5	5.9		97.2			42.6	40.1
Level of Service	E	A	A	E	B	A		F			D	D
Approach Delay (s)		9.3			17.8			97.2			42.3	
Approach LOS		A			B			F			D	

Intersection Summary			
HCM 2000 Control Delay	21.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	88.2%	ICU Level of Service	E
Analysis Period (min)	15		

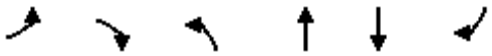
c Critical Lane Group



Movement	EBT	EBR	WBL	WBT	NWL	NWR
Lane Configurations						
Traffic Volume (veh/h)	209	1	2	183	3	8
Future Volume (Veh/h)	209	1	2	183	3	8
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Hourly flow rate (vph)	286	1	3	251	4	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)				553		
pX, platoon unblocked						
vC, conflicting volume			287		544	286
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			287		544	286
tC, single (s)			4.1		6.7	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.8	3.4
p0 queue free %			100		99	98
cM capacity (veh/h)			1287		450	727

Direction, Lane #	EB 1	WB 1	NW 1
Volume Total	287	254	15
Volume Left	0	3	4
Volume Right	1	0	11
cSH	1700	1287	624
Volume to Capacity	0.17	0.00	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.0	0.1	10.9
Lane LOS		A	B
Approach Delay (s)	0.0	0.1	10.9
Approach LOS			B

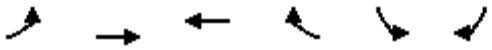
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	21.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	69	21	35	139	115	73
Future Volume (Veh/h)	69	21	35	139	115	73
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.64	0.64	0.64	0.64	0.64	0.64
Hourly flow rate (vph)	108	33	55	217	180	114
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					923	
pX, platoon unblocked						
vC, conflicting volume	564	237	294			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	564	237	294			
tC, single (s)	6.5	6.3	4.1			
tC, 2 stage (s)						
tF (s)	3.6	3.4	2.2			
p0 queue free %	76	96	96			
cM capacity (veh/h)	453	790	1262			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	141	272	294
Volume Left	108	55	0
Volume Right	33	0	114
cSH	503	1262	1700
Volume to Capacity	0.28	0.04	0.17
Queue Length 95th (ft)	28	3	0
Control Delay (s)	14.9	1.9	0.0
Lane LOS	B	A	
Approach Delay (s)	14.9	1.9	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	34.9%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	57	101	7	33	0
Future Volume (Veh/h)	0	57	101	7	33	0
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.61	0.61	0.61	0.61	0.61	0.61
Hourly flow rate (vph)	0	93	166	11	54	0
Pedestrians					2	
Lane Width (ft)					12.0	
Walking Speed (ft/s)					4.0	
Percent Blockage					0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	179				266	174
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	179				266	174
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				93	100
cM capacity (veh/h)	1407				726	874

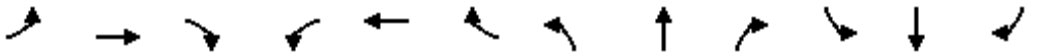
Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	93	177	54
Volume Left	0	0	54
Volume Right	0	11	0
cSH	1407	1700	726
Volume to Capacity	0.00	0.10	0.07
Queue Length 95th (ft)	0	0	6
Control Delay (s)	0.0	0.0	10.4
Lane LOS			B
Approach Delay (s)	0.0	0.0	10.4
Approach LOS			B

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	16.2%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBT	SBT	SBR
Lane Group Flow (vph)	18	1884	261	143	1500	13	191	180	27
v/c Ratio	0.19	0.94	0.27	0.82	0.63	0.01	0.95	0.58	0.08
Control Delay	57.6	33.7	8.6	79.8	12.8	0.7	97.1	50.5	0.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	57.6	33.7	8.6	79.8	12.8	0.7	97.1	50.5	0.4
Queue Length 50th (ft)	14	701	58	108	395	0	134	123	0
Queue Length 95th (ft)	38	#911	106	m#216	m591	m0	#269	198	2
Internal Link Dist (ft)		263			2471		389	767	
Turn Bay Length (ft)	470		110	455		100			75
Base Capacity (vph)	156	2014	962	175	2375	1109	225	354	385
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.12	0.94	0.27	0.82	0.63	0.01	0.85	0.51	0.07

Intersection Summary

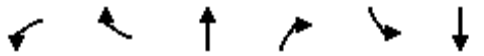
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	17	1733	240	132	1380	12	89	41	45	44	121	25
Future Volume (vph)	17	1733	240	132	1380	12	89	41	45	44	121	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0	6.0	4.0	6.0	6.0		4.0			4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.97	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	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.97			1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.99	1.00
Satd. Flow (prot)	1703	3438	1573	1770	3505	1615		1736			1818	1495
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.54			0.86	1.00
Satd. Flow (perm)	1703	3438	1573	1770	3505	1615		957			1577	1495
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	18	1884	261	143	1500	13	97	45	49	48	132	27
RTOR Reduction (vph)	0	0	41	0	0	4	0	10	0	0	0	22
Lane Group Flow (vph)	18	1884	220	143	1500	9	0	181	0	0	180	5
Confl. Peds. (#/hr)			3				3					
Heavy Vehicles (%)	6%	5%	0%	2%	3%	0%	1%	5%	5%	9%	1%	8%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		4
Actuated Green, G (s)	3.3	70.3	70.3	11.9	78.9	78.9		23.8			23.8	23.8
Effective Green, g (s)	3.3	70.3	70.3	11.9	78.9	78.9		23.8			23.8	23.8
Actuated g/C Ratio	0.03	0.59	0.59	0.10	0.66	0.66		0.20			0.20	0.20
Clearance Time (s)	4.0	6.0	6.0	4.0	6.0	6.0		4.0			4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0
Lane Grp Cap (vph)	46	2014	921	175	2304	1061		189			312	296
v/s Ratio Prot	0.01	c0.55		c0.08	0.43							
v/s Ratio Perm			0.14			0.01		c0.19			0.11	0.00
v/c Ratio	0.39	0.94	0.24	0.82	0.65	0.01		0.96			0.58	0.02
Uniform Delay, d1	57.4	22.8	12.0	53.0	12.3	7.1		47.6			43.5	38.7
Progression Factor	1.00	1.00	1.00	0.94	0.91	1.00		1.00			1.00	1.00
Incremental Delay, d2	5.4	9.7	0.6	21.3	1.2	0.0		52.2			2.6	0.0
Delay (s)	62.8	32.5	12.6	71.0	12.4	7.1		99.7			46.1	38.7
Level of Service	E	C	B	E	B	A		F			D	D
Approach Delay (s)		30.3			17.5			99.7			45.2	
Approach LOS		C			B			F			D	

Intersection Summary			
HCM 2000 Control Delay	29.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	88.8%	ICU Level of Service	E
Analysis Period (min)	15		

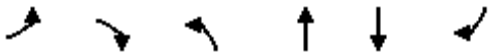
c Critical Lane Group



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	18	21	157	2	8	478
Future Volume (Veh/h)	18	21	157	2	8	478
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	21	25	187	2	10	569
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						553
pX, platoon unblocked						
vC, conflicting volume	777	188			189	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	777	188			189	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	97			99	
cM capacity (veh/h)	366	859			1397	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	46	189	579
Volume Left	21	0	10
Volume Right	25	2	0
cSH	532	1700	1397
Volume to Capacity	0.09	0.11	0.01
Queue Length 95th (ft)	7	0	1
Control Delay (s)	12.4	0.0	0.2
Lane LOS	B		A
Approach Delay (s)	12.4	0.0	0.2
Approach LOS	B		

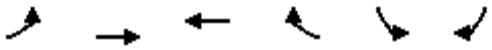
Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	41.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	45	22	24	116	382	117
Future Volume (Veh/h)	45	22	24	116	382	117
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	51	25	27	132	434	133
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)					920	
pX, platoon unblocked						
vC, conflicting volume	686	500	567			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	686	500	567			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	87	96	97			
cM capacity (veh/h)	400	574	1015			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	76	159	567
Volume Left	51	27	0
Volume Right	25	0	133
cSH	445	1015	1700
Volume to Capacity	0.17	0.03	0.33
Queue Length 95th (ft)	15	2	0
Control Delay (s)	14.8	1.7	0.0
Lane LOS	B	A	
Approach Delay (s)	14.8	1.7	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	37.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	51	109	32	16	1
Future Volume (Veh/h)	0	51	109	32	16	1
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	0	59	125	37	18	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	162				202	144
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	162				202	144
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				98	100
cM capacity (veh/h)	1429				791	909

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	59	162	19
Volume Left	0	0	18
Volume Right	0	37	1
cSH	1429	1700	796
Volume to Capacity	0.00	0.10	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	0.0	0.0	9.6
Lane LOS			A
Approach Delay (s)	0.0	0.0	9.6
Approach LOS			A

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	17.7%	ICU Level of Service	A
Analysis Period (min)	15		