EPRPC EPR, P,C. "ENGINEERING & PLANNING RESOURCES"
902 E JEFFERSON ST. UNIT 101, CHARLOTTESVILLE, VA 22902

MEMORANDUM

TO: KYKE REDINGER

FROM: BILL WUENSCH, P.E., PTOE;
YE WANG, EIT

ORGANIZATION:

DATE: APRIL 9, 2020
REVISED: JUNE 8, 2020

PHONE NUMBER:

SENDER'S REFERENCE NUMBER:

RE: ROYAL FERN DEVELOPMENT TRAFFIC IMPACT ANALYSIS SUPPLEMENT UPDATE APRIL 2020

YOUR REFERENCE NUMBER:

☐ URGENT X FOR YOUR USE ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

The purpose of this memorandum is to provide a supplement to the original Royal Fern Development Traffic Impact Study and study Supplement #1 (EPR prepared on March 18th, 2019 and May 30th, 2019). This additional document is required per a change in site plan land uses.

Per the previous studies, the study intersections include following:

1. 5th Street Ext./Wahoo Way (Right-in-Right-out)
2. 5th Street Ext./Old Lynchburg Rd
3. Old Lynchburg Rd/Country Green Rd
4. New median opening just South of Intersection 2 (RCUT scenario only)

Trip Generation

The updated trip generation details for Royal Fern development was prepared by Shimp Engineering and verified by EPR. **Table 1** below summarizes the trip generation result:

Table 1: Trip Generation Details

Use	Square Footage	LU Code	IV	AM			PM			Daily Total
				In	Out	Total	In	Out	Total	
Office	102,000	710 - General Office Building	102 (1,000 SF GFA)	105	17	122	19	97	116	1082
Retail	5,000	932 - High Turnover (Sit-Down) Restaurant	5 (1,000 SF GFA)	27	23	50	30	19	49	561
	5,000	876 - Apparel Store	5 (1,000 SF GFA)	4	1	5	11	10	21	332
	4,000	814 - Variety Store	4 (1,000 SF GFA)	7	6	13	14	13	27	254
Hotel		312 - Business Hotel	125 Rooms	20	29	49	22	18	40	514
Self Storage	100,000	151 - Mini Warehousing	100 (1000 sq ft GFA)	6	4	10	8	9	17	151
			COMBINED	169	80	249	104	166	270	2894
Residential	150 units	221 - Multifamily Housing	150 Units*	14	40	54	40	26	66	816

*128 Units at Site 2 (West of Old Lynchburg Rd) and 22 Units at Site 1 (East of Old Lynchburg Rd)

As indicated in Table 1 above, approximately 3710 daily trips, 303 AM peak and 336 PM peak trips were estimated for the proposed Royal Fern development with the new site plan. Trip distribution is assumed to be the same as the previous study effort for each land use type, **Figure 2-4** display the detailed distribution percentage at study intersections.

Traffic Operations Result

The traffic operational results were analyzed and compared with 2024 no build for the following four scenarios:

1. 2024 build with no mitigation (Base)
2. 2024 build with signal at 5th Ext and Old Lynchburg Rd (Mitigation 1)
3. 2024 build with roundabout at 5th Ext and Old Lynchburg Rd (Mitigation 2)
4. 2024 build with signalized RCUT intersection (Mitigation 3)

2024 No Build Conditions (Base)

As needed for comparison purposes, the 2024 no build traffic operations analysis results are shown in **Table 2** below:

Table 2: 2024 No Build Traffic Operation Results

Intersection # and name	Approach	Movement	AM			PM		
			LOS	Delay	Queue	LOS	Delay	Queue
1. 5th Ext and Wahoo Way	5th EB	EBT	A	0	0	A	0	0
	5th WB	WBR	A	0	0	A	0	0
		WBT	A	0	0	A	0	0
	Wahoo Way SB	SBR	B	10	35	B	12.2	48
3. 5th Ext and Old Lynchburg Rd	5th EB	EBL	A	8.1	73	A	9.1	58
		EBT	A	0	15	A	0	0
		EBR	A	0	0	A	0	0
	5th WB	WBL	A	9.9	59	A	8.2	19
		WBT	A	0	0	A	0	0
		WBR	A	0	27	A	0	10
	County NB	NBT/NBL	A	0	0	C	9.9	11
		NBR	B	11.2	31	A	24.8	52
	Old Lynchburg SB	SBT/SBL	F	546	434	F	404.6	435
		SBR	A	9.4	255	B	11.2	255
5. Old Lynchburg Road	Country Green Road EB	EBL/EBR	B	11.7	1181	B	11.8	991

and Country Green Road	Old Lynchburg NB	NBL	A	7.8	37	A	8.1	50
		NBT	A	0	0	A	0	0
	Old Lynchburg SB	SBT/SBR	A	0	280	A	0	286

Red indicates exceeded maximum link distance.

As shown in Table 2, in 2024 no build conditions:

Both intersection 1 and 5 will operate at LOS A overall for both AM and PM peak. But the intersection of Old Lynchburg Road and 5th Street Ext. will operate at LOS F and E with significantly long queues at the southbound approach. The maximum queue length at the southbound approach at 5th Street Ext and Old Lynchburg Road (approximately 450ft) will spill back to the intersection of Country Green Road/Old Lynchburg Road and result in additional 280 feet queuing length at eastbound approach and 1000 feet of queuing at the southbound approach.

2024 Build Conditions

Synchro/SimTraffic 11 was used to analyze the 2024 build traffic operations. The level of service, delay, and queue results are summarized in **Table 3** below and included in Appendix B (HCM Report) and Appendix C (SimTraffic Queue).

Table 3: 2024 Build Traffic Operations Results

Intersection	Approach	Movement	AM			PM		
			LOS	Delay	Queue	LOS	Delay	Queue
1. 5th Ext and Wahoo Way *No SBL	5th EB	EBT	A	0	0	A	0	0
	5th WB	WBR	A	0	0	A	0	0
		WBT	A	0	0	A	0	0
	Wahoo Way SB	SBR	B	10.4	53	C	15.6	111
	Overall		A	0.4		A	1.4	
3. 5th Ext and Old Lynchburg Rd	5th EB	EBL	B	10.1	133	B	13.4	124
		EBT	A	0	2	A	0	3
		EBR	A	0	0	A	0	0
	5th WB	WBL/U	B	11.6	54	A	9.9	40
		WBT	A	0	0	A	0	2
		WBR	A	0	35	A	0	30
	County NB	NBT/NBL	A	0	0	E	37.4	19
		NBR	B	11.2	31	A	9.9	53
	Old Lynchburg SB	SBT/SBL	F	1504.7	255	F	1039.6	255
		SBR	A	9.5	428	B	12.4	430
	Overall		F	263.9		F	140.9	
5. Old Lynchburg Road	Country Green Road EB	EBL/EBR	B	12.9	386	B	13.1	390
	Old Lynchburg NB	NBL	A	7.9	36	A	8.5	62

and Country Green Road		NBT	A	0	0	A	0	0
	Old Lynchburg SB	SBT/SBR	A	0	290	A	0	290
	Overall		A	3.3		A	2.4	

Red indicates exceeded maximum link distance.

As shown in Table 3, in 2024 build conditions:

All study intersections will operate at LOS A except for intersection 3, which will operate LOS F for both AM and PM. The 2024 build traffic operation result is nearly identical to 2024 no build traffic operations. Extremely long delays and queue length are anticipated for the southbound movement at the 5th Ext and Old Lynchburg intersection, with spillback to intersection 5 which could impact access for the eastbound movement. The inability to find gaps for the southbound vehicles at intersection 3 could cause potential safety concerns where drivers become aggressive in pursuing small gaps as opportunities to enter the median for a two-stage turn.

2024 Build with Signal at 5th Ext and Old Lynchburg Rd (Mitigation 1 Scenario)

Synchro/SimTraffic 11 was used to analyze the 2024 build mitigation 1 scenario traffic operations. The level of service, delay, and queue results are summarized in **Table 4** below and included in Appendix B (HCM Report) and Appendix C (SimTraffic Queue). Same preliminary timing plan is being used from Supplement #1.

Table 4: 2024 Build with Traffic Signal (Mitigation Scenario 1) Traffic Operations Results

Intersection	Approach	Movement	AM			PM		
			LOS	Delay	Queue	LOS	Delay	Queue
1. 5th Ext and Wahoo Way *No SBL	5th EB	EBT	A	0	0	A	0	0
	5th WB	WBR	A	0	0	A	0	0
		WBT	A	0	0	A	0	0
	Wahoo Way SB	SBR	B	10.4	55	C	15.6	113
	Overall		A	0.4		A	1.4	
3. 5th Ext and Old Lynchburg Rd *Signalized	5th EB	EBL	B	13.8	132	B	15.4	99
		EBT	C	23.5	184	B	17.1	122
		EBR	B	15.4	19	B	14.6	2
	5th WB	WBL/U	B	17	80	B	13.4	54
		WBT	B	18.8	127	C	25.9	221
		WBR	B	18.3	118	B	16.4	120
	County NB	NBT/NBL	A	0	0	C	25.8	20
		NBR	C	31.6	31	C	26	60
	Old Lynchburg SB	SBT/SBL	D	38.5	226	D	38.1	224
		SBR	B	18.4	52	B	18.3	116

	Overall		C	23.5		C	22.9	
5. Old Lynchburg Road and Country Green Road	Country Green Road EB	EBL/EBR	B	12.9	102	B	13.1	78
	Old Lynchburg NB	NBL	A	7.9	48	A	8.5	90
		NBT	A	0	0	A	0	0
	Old Lynchburg SB	SBT/SBR	A	0	0	A	0	17
	Overall		A	3.3		A	2.4	

As shown in Table 4, in 2024 build condition with signalized 5th Ext and Old Lynchburg Rd intersection:

The overall traffic operations performance significantly improved as the southbound movement at Old Lynchburg Rd will be able to turn onto 5th Street Ext with reasonable delays. The overall LOS improved to B from F both in AM and PM compared to 2024 Build base scenario. The queue length at the southbound approach is also reduced significantly, which solves the spill back issue at Old Lynchburg Rd and Country Green Rd intersection. All other intersections will operate at acceptable levels of service.

2024 Build with Roundabout at 5th Ext and Old Lynchburg Rd (Mitigation Scenario 2)

A roundabout configuration was also tested to see if this type of intersection could be a viable option for traffic control at Old Lynchburg Rd and 5th Street Ext intersection. **Appendix D** provides the summary of LOS by leg and queue information generated by Sidra. The results suggest that the roundabout option performs better in terms of minimizing overall queuing, LOS and delay compared to the signalized intersection scenario (Mitigation Scenario 1). Note that the configuration considered in this analysis is functionally a one lane roundabout for through lanes and left turns, along with dedicated right turn lanes onto the side streets. This roundabout also provides a transition method for the four-lane road.

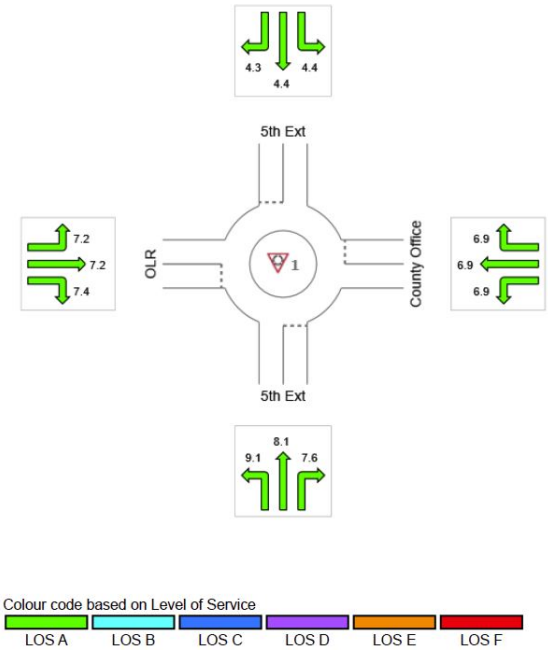


Figure 1. LOS in 2024 Build AM Roundabout Scenario

2024 Build with Signalized RCUT (Mitigation Scenario 3)

Traffic operations analyses for an RCUT scenario was completed with updated traffic volumes using Synchro/SimTraffic 11. Based on the preliminary engineering evaluation and test results from Supplement #1, only the RCUT with signal (at the eastbound approach to accommodate the westbound u-turns) scenario was tested due to relatively high thru volume on 5th Street Ext.

Table 6. RCUT with Signal Traffic Operation Results

Intersection	Approach	Movement	AM			PM		
			LOS	Delay	Queue	LOS	Delay	Queue
1. 5th Ext and Wahoo Way *No SBL	5th EB	EBU	A	0	0	C	19.5	5
		EBT	A	0	0	A	0	0
	5th WB	WBR	A	0	0	A	0	0
		WBT	A	0	0	A	0	0
	Wahoo Way SB	SBR	B	10.4	59	C	15.6	111
	Overall		A	0.4		A	1.4	
3. 5th Ext and Old Lynchburg Rd	5th EB	EBL	B	10.1	153	B	12.4	125
		EBT	A	0	1	A	0	0
		EBR	A	0	0	A	0	0
	5th WB	WBL/U	C	16.1	86	B	12.8	55
		WBT	A	0	3	A	0	0
		WBR	A	0	44	A	0	37

	County NB	NBR	B	13.3	27	B	11.3	65
	Old Lynchburg SB	SBR	B	13.3	187	C	20.2	177
	Overall		A	3.5		A	3.9	
5. Old Lynchburg Road and Country Green Road	Country Green Road EB	EBL/EBR	B	12.9	98	B	12.9	76
	Old Lynchburg NB	NBL	A	7.9	60	A	8.3	66
		NBT	A	0	0	A	0	0
	Old Lynchburg SB	SBT/SBR	A	0	2	A	0	19
	Overall		A	3.3		A	2.4	
99. Signalized RCUT	5th EB	EBT	B	10.9	282	A	7.8	165
	5th WB	WBT	A	0	0	A	0.2	0
		WBU	C	33.9	263	C	28	218
	Overall		B	14		A	7.6	

As shown in Table 5 in the RCUT with signal scenario, 5th Street Ext/Old Lynchburg Rd intersection will perform well. The queue length is anticipated to be minor on the sidestreets with no spill-back from the 5th Street Ext/Old Lynchburg Rd intersection. Note however that the maximum queuing length at the signalized RCUT intersection is 287 ft, thus the minimum needed storage plus taper length of 200 ft would be recommended for the westbound u-turn movement.

Findings and Recommendations

Based on the analysis conducted for this Supplement #2 addendum, the findings and conclusions are as follows –

- With the updated site plan for the Royal Fern development, approximately 3710 daily trips, 303 AM peak and 336 PM peak trips are projected based on the ITE Trip Gen Manual.
- Comparing the traffic operations in 2024 no build and 2024 build (Base) scenario, the majority of the impact will be observed at the 5th Street Ext/Old Lynchburg Rd intersection. The delay at southbound left/thru movement will be 958 seconds longer for AM peak and 635 seconds longer for PM peak, with an overall LOS F for both AM and PM. The overall delay and queue changes at other intersections are negligible. Note that once an intersection reaches capacity, even a small increase in volumes can result higher delays.
- **Table 6** below summarizes the southbound performance at Old Lynchburg Rd/5th Street Ext intersection under different mitigation scenarios. The roundabout scenario will have the best result in terms of minimize delay and queue length.

Table 6. Traffic Operation Result Comparison Under Different Mitigation Scenario

Stop Controlled	Old Lynchburg SB	SBT/SBL	F	1504.7	255	F	1039.6	255
		SBR	A	9.5	428	B	12.4	430
	Overall		F	263.9		F	140.9	
Signalized	Old Lynchburg SB	SBT/SBL	D	38.5	226	D	38.1	224
		SBR	B	18.4	52	B	18.3	116
	Overall		C	23.5		C	22.9	
Roundabout	Old Lynchburg SB		B	12.4	55	B	18.5	121
	Overall		A	8.9		A	5.8	
Signalized RCUT	Old Lynchburg SB	SBR	B	13.3	187	C	20.2	177
	Overall		A	3.5		A	3.9	

Red indicates exceeded maximum link distance.

This revised analysis supports the prior recommendation that a traffic signal or roundabout would provide sufficient capacity for the future traffic volumes. The RCUT can work as well, however this will require that very large volume of traffic make the right turn which will then form a long queue at the new signalized u-turn location.

Attachments:

List of Figures:

Appendix:

Figure 1 2024 No Build Volume (2020 Site Plan)

Figure 2 Trip Distribution (Site 2: 128 Multi Family Units)

Figure 3 Trip Distribution (Site 1: 22 Multi Family Units)

Figure 4 Trip Distribution (Site 1: Combined Commercial)

Figure 5 Trip Assignment (Site 2: 128 Multi Family Units)

Figure 6 Trip Assignment (Site 1: 22 Multi Family Units)

Figure 7 Trip Assignment (Site 1: Combined Commercial)

Figure 8 Trip Assignment (Site 1 and Site 2 combined)

Figure 9 2024 Build Peak Hour Volume (2020 Site Plan)

Appendix A

2020 Trip Generation

ABC ZMA2019-03 Maximum Square Footages

Use	Square Footage	LU Code	IV	AM			PM			Daily Total
				In	Out	Total	In	Out	Total	
Office	102,000	710 - General Office Building	102 (1,000 SF GFA)	105	17	122	19	97	116	1082
Retail	5,000	932 - High Turnover (Sit-Down) Restaurant	5 (1,000 SF GFA)	27	23	50	30	19	49	561
	5,000	876 - Apparel Store	5 (1,000 SF GFA)	4	1	5	11	10	21	332
	4,000	814 - Variety Store	4 (1,000 SF GFA)	7	6	13	14	13	27	254
Hotel		312 - Business Hotel	125 Rooms	20	29	49	22	18	40	514
Self Storage	100,000	151 - Mini Warehousing	100 (1000 sq ft GFA)	6	4	10	8	9	17	151
			COMBINED	169	80	249	104	166	270	2894
Residential	150 units	221 - Multifamily Housing	150 Units	14	40	54	40	26	66	816
						552			606	6090
ITE 10TH EDITION			Grand Total	183	120	303	144	192	336	3710

Appendix B

Synchro HCM Reports

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	1142	466	87	0	71
Future Vol, veh/h	0	1142	466	87	0	71
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	425	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	3	-3	-	5	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	2	5	23	0	0
Mvmt Flow	0	1190	485	91	0	74

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	243
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	0	-	-	-	0	738
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	738
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	738
HCM Lane V/C Ratio	-	-	-	0.1
HCM Control Delay (s)	-	-	-	10.4
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.3

Intersection	
Int Delay, s/veh	263.9

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	176	770	4	24	68	258	310	0	0	3	345	1	26
Future Vol, veh/h	176	770	4	24	68	258	310	0	0	3	345	1	26
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	-	None	-	-	None	-	-	None
Storage Length	295	-	120	-	325	-	380	-	-	350	255	-	0
Veh in Median Storage, #	-	0	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	2	-	-	-	-2	-	-	1	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	11	2	0	2	0	11	4	0	0	0	2	0	18
Mvmt Flow	191	837	4	26	74	280	337	0	0	3	375	1	28

Major/Minor	Major1			Major2				Minor1			Minor2		
Conflicting Flow All	617	0	0	837	841	0	0	1560	2036	419	1281	1703	140
Stage 1	-	-	-	-	-	-	-	1219	1219	-	480	480	-
Stage 2	-	-	-	-	-	-	-	341	817	-	801	1223	-
Critical Hdwy	4.32	-	-	6.44	4.1	-	-	7.7	6.7	7	7.54	6.5	7.26
Critical Hdwy Stg 1	-	-	-	-	-	-	-	6.7	5.7	-	6.54	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.7	5.7	-	6.54	5.5	-
Follow-up Hdwy	2.31	-	-	2.52	2.2	-	-	3.5	4	3.3	3.52	4	3.48
Pot Cap-1 Maneuver	900	-	-	422	803	-	-	71	51	582	~ 123	93	834
Stage 1	-	-	-	-	-	-	-	182	238	-	536	558	-
Stage 2	-	-	-	-	-	-	-	641	376	-	~ 344	254	-
Platoon blocked, %		-	-			-	-						
Mov Cap-1 Maneuver	900	-	-	649	649	-	-	50	34	582	~ 91	62	834
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	50	34	-	~ 91	62	-
Stage 1	-	-	-	-	-	-	-	143	188	-	422	472	-
Stage 2	-	-	-	-	-	-	-	523	318	-	~ 269	200	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.9	1.6	11.2	$ 1400.2
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	-	582	900	-	-	649	-	-	91	834
HCM Lane V/C Ratio	-	0.006	0.213	-	-	0.154	-	-	4.133	0.034
HCM Control Delay (s)	0	11.2	10.1	-	-	11.6	-	-	$ 1504.7	9.5
HCM Lane LOS	A	B	B	-	-	B	-	-	F	A
HCM 95th %tile Q(veh)	-	0	0.8	-	-	0.5	-	-	39.2	0.1

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	74	57	53	241	188	18
Future Vol, veh/h	74	57	53	241	188	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	155	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-3	-	-	-3	3	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	17	10	4	0	0
Mvmt Flow	80	62	58	262	204	20

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	592	214	224	0	-	0
Stage 1	214	-	-	-	-	-
Stage 2	378	-	-	-	-	-
Critical Hdwy	5.8	6.07	4.2	-	-	-
Critical Hdwy Stg 1	4.8	-	-	-	-	-
Critical Hdwy Stg 2	4.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.453	2.29	-	-	-
Pot Cap-1 Maneuver	521	804	1299	-	-	-
Stage 1	856	-	-	-	-	-
Stage 2	743	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	498	804	1299	-	-	-
Mov Cap-2 Maneuver	498	-	-	-	-	-
Stage 1	817	-	-	-	-	-
Stage 2	743	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.9	1.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1299	-	597	-	-
HCM Lane V/C Ratio	0.044	-	0.239	-	-
HCM Control Delay (s)	7.9	-	12.9	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.9	-	-

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	813	874	132	0	179
Future Vol, veh/h	0	813	874	132	0	179
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	425	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	3	-3	-	5	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	2	5	23	0	0
Mvmt Flow	0	847	910	138	0	186

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	455
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	0	-	-	-	0	524
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	524
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	15.6
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	524
HCM Lane V/C Ratio	-	-	-	0.356
HCM Control Delay (s)	-	-	-	15.6
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	1.6

Intersection	
Int Delay, s/veh	140.9

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	80	431	1	36	16	750	456	1	0	52	294	1	81
Future Vol, veh/h	80	431	1	36	16	750	456	1	0	52	294	1	81
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	-	None	-	-	None	-	-	None
Storage Length	295	-	120	-	325	-	380	-	-	350	255	-	0
Veh in Median Storage, #	-	0	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	2	-	-	-	-2	-	-	1	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	11	2	0	2	0	11	4	0	0	0	2	0	18
Mvmt Flow	82	444	1	37	16	773	470	1	0	54	303	1	84

Major/Minor	Major1			Major2				Minor1			Minor2		
Conflicting Flow All	1243	0	0	444	445	0	0	1101	1957	222	1265	1488	387
Stage 1	-	-	-	-	-	-	-	608	608	-	879	879	-
Stage 2	-	-	-	-	-	-	-	493	1349	-	386	609	-
Critical Hdwy	4.32	-	-	6.44	4.1	-	-	7.7	6.7	7	7.54	6.5	7.26
Critical Hdwy Stg 1	-	-	-	-	-	-	-	6.7	5.7	-	6.54	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.7	5.7	-	6.54	5.5	-
Follow-up Hdwy	2.31	-	-	2.52	2.2	-	-	3.5	4	3.3	3.52	4	3.48
Pot Cap-1 Maneuver	509	-	-	751	1126	-	-	159	58	783	~ 126	125	568
Stage 1	-	-	-	-	-	-	-	439	473	-	309	368	-
Stage 2	-	-	-	-	-	-	-	517	205	-	609	488	-
Platoon blocked, %		-	-			-	-						
Mov Cap-1 Maneuver	509	-	-	793	793	-	-	112	45	783	~ 98	98	568
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	112	45	-	~ 98	98	-
Stage 1	-	-	-	-	-	-	-	368	397	-	~ 259	343	-
Stage 2	-	-	-	-	-	-	-	410	191	-	476	409	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.1	0.4	10.4	$ 818.3
HCM LOS			B	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	112	783	509	-	-	793	-	-	98	568
HCM Lane V/C Ratio	0.009	0.068	0.162	-	-	0.068	-	-	3.103	0.147
HCM Control Delay (s)	37.4	9.9	13.4	-	-	9.9	-	-	$ 1039.6	12.4
HCM Lane LOS	E	A	B	-	-	A	-	-	F	B
HCM 95th %tile Q(veh)	0	0.2	0.6	-	-	0.2	-	-	29.6	0.5

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	23	51	118	306	240	79
Future Vol, veh/h	23	51	118	306	240	79
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	155	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-3	-	-	-3	3	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	17	10	4	0	0
Mvmt Flow	25	55	128	333	261	86

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	893	304	347	0	-	0
Stage 1	304	-	-	-	-	-
Stage 2	589	-	-	-	-	-
Critical Hdwy	5.8	6.07	4.2	-	-	-
Critical Hdwy Stg 1	4.8	-	-	-	-	-
Critical Hdwy Stg 2	4.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.453	2.29	-	-	-
Pot Cap-1 Maneuver	365	720	1169	-	-	-
Stage 1	792	-	-	-	-	-
Stage 2	616	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	325	720	1169	-	-	-
Mov Cap-2 Maneuver	325	-	-	-	-	-
Stage 1	706	-	-	-	-	-
Stage 2	616	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.1	2.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1169	-	523	-	-
HCM Lane V/C Ratio	0.11	-	0.154	-	-
HCM Control Delay (s)	8.5	-	13.1	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.5	-	-

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	1142	466	87	0	71
Future Vol, veh/h	0	1142	466	87	0	71
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	425	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	3	-3	-	5	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	2	5	23	0	0
Mvmt Flow	0	1190	485	91	0	74

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	243
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	0	-	-	-	0	738
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	738
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	738
HCM Lane V/C Ratio	-	-	-	0.1
HCM Control Delay (s)	-	-	-	10.4
HCM Lane LOS	-	-	-	B
HCM 95th %tile Q(veh)	-	-	-	0.3

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	74	57	53	241	188	18
Future Vol, veh/h	74	57	53	241	188	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	155	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-3	-	-	-3	3	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	17	10	4	0	0
Mvmt Flow	80	62	58	262	204	20

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	592	214	224	0	-	0
Stage 1	214	-	-	-	-	-
Stage 2	378	-	-	-	-	-
Critical Hdwy	5.8	6.07	4.2	-	-	-
Critical Hdwy Stg 1	4.8	-	-	-	-	-
Critical Hdwy Stg 2	4.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.453	2.29	-	-	-
Pot Cap-1 Maneuver	521	804	1299	-	-	-
Stage 1	856	-	-	-	-	-
Stage 2	743	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	498	804	1299	-	-	-
Mov Cap-2 Maneuver	498	-	-	-	-	-
Stage 1	817	-	-	-	-	-
Stage 2	743	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.9	1.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1299	-	597	-	-
HCM Lane V/C Ratio	0.044	-	0.239	-	-
HCM Control Delay (s)	7.9	-	12.9	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.9	-	-

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	176	770	4	24	68	258	310	0	0	3	345	1
Future Volume (vph)	176	770	4	24	68	258	310	0	0	3	345	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%				-2%			1%			0%
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0	6.0			6.0		6.0
Lane Util. Factor	1.00	0.95	1.00		1.00	0.95	1.00			1.00		1.00
Frt	1.00	1.00	0.85		1.00	1.00	0.85			0.85		1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00	1.00			1.00		0.95
Satd. Flow (prot)	1610	3504	1599		1814	3285	1568			1607		1774
Flt Permitted	0.51	1.00	1.00		0.22	1.00	1.00			1.00		0.95
Satd. Flow (perm)	870	3504	1599		429	3285	1568			1607		1774
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)	191	837	4	26	74	280	337	0	0	3	375	1
RTOR Reduction (vph)	0	0	3	0	0	0	244	0	0	3	0	0
Lane Group Flow (vph)	191	837	1	0	100	280	93	0	0	0	0	376
Heavy Vehicles (%)	11%	2%	0%	2%	0%	11%	4%	0%	0%	0%	2%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	pm+pt	NA	Perm			Perm	Split	NA
Protected Phases	5	2		1	1	6		8	8		4	4
Permitted Phases	2		2	6	6		6			8		
Actuated Green, G (s)	26.2	20.1	20.1		21.6	17.8	17.8			0.8		16.0
Effective Green, g (s)	26.2	20.1	20.1		21.6	17.8	17.8			0.8		16.0
Actuated g/C Ratio	0.40	0.31	0.31		0.33	0.28	0.28			0.01		0.25
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0	6.0			6.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0	3.0			3.0		3.0
Lane Grp Cap (vph)	422	1088	496		224	903	431			19		438
v/s Ratio Prot	c0.04	c0.24			0.03	0.09						c0.21
v/s Ratio Perm	0.14		0.00		0.12		0.06			c0.00		
v/c Ratio	0.45	0.77	0.00		0.45	0.31	0.22			0.00		0.86
Uniform Delay, d1	13.0	20.2	15.4		15.5	18.6	18.1			31.6		23.3
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00			1.00		1.00
Incremental Delay, d2	0.8	3.3	0.0		1.4	0.2	0.3			0.0		15.3
Delay (s)	13.8	23.5	15.4		17.0	18.8	18.3			31.6		38.5
Level of Service	B	C	B		B	B	B			C		D
Approach Delay (s)		21.7				18.3			31.6			37.2
Approach LOS		C				B			C			D

Intersection Summary			
HCM 2000 Control Delay	23.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	64.7	Sum of lost time (s)	24.0
Intersection Capacity Utilization	69.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	26
Future Volume (vph)	26
Ideal Flow (vphpl)	1900
Grade (%)	
Total Lost time (s)	6.0
Lane Util. Factor	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1369
Flt Permitted	1.00
Satd. Flow (perm)	1369
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	28
RTOR Reduction (vph)	21
Lane Group Flow (vph)	7
Heavy Vehicles (%)	18%
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Actuated Green, G (s)	16.0
Effective Green, g (s)	16.0
Actuated g/C Ratio	0.25
Clearance Time (s)	6.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	338
v/s Ratio Prot	
v/s Ratio Perm	0.01
v/c Ratio	0.02
Uniform Delay, d1	18.4
Progression Factor	1.00
Incremental Delay, d2	0.0
Delay (s)	18.4
Level of Service	B
Approach Delay (s)	
Approach LOS	

Intersection Summary

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↑↑	↑↑	↱		↱
Traffic Vol, veh/h	0	813	874	132	0	179
Future Vol, veh/h	0	813	874	132	0	179
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	425	-	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	3	-3	-	5	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	2	5	23	0	0
Mvmt Flow	0	847	910	138	0	186

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	-	0	-	0	-	455
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	-	-	-	-	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	0	-	-	-	0	524
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	-	-	-	-	-	524
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	15.6
HCM LOS			C

Minor Lane/Major Mvmt	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	-	-	-	524
HCM Lane V/C Ratio	-	-	-	0.356
HCM Control Delay (s)	-	-	-	15.6
HCM Lane LOS	-	-	-	C
HCM 95th %tile Q(veh)	-	-	-	1.6

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	23	51	118	306	240	79
Future Vol, veh/h	23	51	118	306	240	79
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	155	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-3	-	-	-3	3	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	17	10	4	0	0
Mvmt Flow	25	55	128	333	261	86

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	893	304	347	0	-	0
Stage 1	304	-	-	-	-	-
Stage 2	589	-	-	-	-	-
Critical Hdwy	5.8	6.07	4.2	-	-	-
Critical Hdwy Stg 1	4.8	-	-	-	-	-
Critical Hdwy Stg 2	4.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.453	2.29	-	-	-
Pot Cap-1 Maneuver	365	720	1169	-	-	-
Stage 1	792	-	-	-	-	-
Stage 2	616	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	325	720	1169	-	-	-
Mov Cap-2 Maneuver	325	-	-	-	-	-
Stage 1	706	-	-	-	-	-
Stage 2	616	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	13.1	2.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1169	-	523	-	-
HCM Lane V/C Ratio	0.11	-	0.154	-	-
HCM Control Delay (s)	8.5	-	13.1	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.5	-	-

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	80	431	1	36	16	750	456	1	0	52	294	1
Future Volume (vph)	80	431	1	36	16	750	456	1	0	52	294	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		2%				-2%			1%			0%
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0	6.0		6.0	6.0		6.0
Lane Util. Factor	1.00	0.95	1.00		1.00	0.95	1.00		1.00	1.00		1.00
Frt	1.00	1.00	0.85		1.00	1.00	0.85		1.00	0.85		1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00	1.00		0.95	1.00		0.95
Satd. Flow (prot)	1610	3504	1599		1798	3285	1568		1796	1607		1774
Flt Permitted	0.25	1.00	1.00		0.49	1.00	1.00		0.95	1.00		0.95
Satd. Flow (perm)	426	3504	1599		932	3285	1568		1796	1607		1774
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	82	444	1	37	16	773	470	1	0	54	303	1
RTOR Reduction (vph)	0	0	1	0	0	0	338	0	0	52	0	0
Lane Group Flow (vph)	82	444	0	0	53	773	132	0	1	2	0	304
Heavy Vehicles (%)	11%	2%	0%	2%	0%	11%	4%	0%	0%	0%	2%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	pm+pt	NA	Perm	Split	NA	Perm	Split	NA
Protected Phases	5	2		1	1	6		8	8		4	4
Permitted Phases	2		2	6	6		6			8		
Actuated Green, G (s)	18.5	15.9	15.9		18.5	15.9	15.9		2.6	2.6		11.5
Effective Green, g (s)	18.5	15.9	15.9		18.5	15.9	15.9		2.6	2.6		11.5
Actuated g/C Ratio	0.33	0.28	0.28		0.33	0.28	0.28		0.05	0.05		0.20
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0	6.0		6.0	6.0		6.0
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)	193	984	449		344	922	440		82	73		360
v/s Ratio Prot	c0.02	0.13			0.01	c0.24			0.00			c0.17
v/s Ratio Perm	0.12		0.00		0.04		0.08			c0.00		
v/c Ratio	0.42	0.45	0.00		0.15	0.84	0.30		0.01	0.03		0.84
Uniform Delay, d1	13.9	16.8	14.6		13.2	19.1	16.0		25.8	25.8		21.7
Progression Factor	1.00	1.00	1.00		1.00	1.00	1.00		1.00	1.00		1.00
Incremental Delay, d2	1.5	0.3	0.0		0.2	6.7	0.4		0.1	0.2		16.4
Delay (s)	15.4	17.1	14.6		13.4	25.9	16.4		25.8	26.0		38.1
Level of Service	B	B	B		B	C	B		C	C		D
Approach Delay (s)		16.8				21.9			26.0			33.8
Approach LOS		B				C			C			C

Intersection Summary			
HCM 2000 Control Delay	22.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	56.6	Sum of lost time (s)	24.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	81
Future Volume (vph)	81
Ideal Flow (vphpl)	1900
Grade (%)	
Total Lost time (s)	6.0
Lane Util. Factor	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1369
Flt Permitted	1.00
Satd. Flow (perm)	1369
Peak-hour factor, PHF	0.97
Adj. Flow (vph)	84
RTOR Reduction (vph)	67
Lane Group Flow (vph)	17
Heavy Vehicles (%)	18%
Turn Type	Perm
Protected Phases	
Permitted Phases	4
Actuated Green, G (s)	11.5
Effective Green, g (s)	11.5
Actuated g/C Ratio	0.20
Clearance Time (s)	6.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	278
v/s Ratio Prot	
v/s Ratio Perm	0.01
v/c Ratio	0.06
Uniform Delay, d1	18.2
Progression Factor	1.00
Incremental Delay, d2	0.1
Delay (s)	18.3
Level of Service	B
Approach Delay (s)	
Approach LOS	

Intersection Summary

Intersection	
Int Delay, s/veh	0.4

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Vol, veh/h	0	0	1142	466	87	0	71
Future Vol, veh/h	0	0	1142	466	87	0	71
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	-	300	-	-	425	-	0
Veh in Median Storage, #	-	-	0	0	-	0	-
Grade, %	-	-	3	-3	-	5	-
Peak Hour Factor	92	96	96	96	96	96	96
Heavy Vehicles, %	2	0	2	5	23	0	0
Mvmt Flow	0	0	1190	485	91	0	74

Major/Minor	Major1		Major2		Minor2		
Conflicting Flow All	485	-	0	-	0	-	243
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	6.44	-	-	-	-	-	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.52	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	708	0	-	-	-	0	738
Stage 1	-	0	-	-	-	0	-
Stage 2	-	0	-	-	-	0	-
Platoon blocked, %			-	-	-		
Mov Cap-1 Maneuver	640	-	-	-	-	-	738
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	10.4
HCM LOS			B

Minor Lane/Major Mvmt	EBU	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	640	-	-	-	738
HCM Lane V/C Ratio	-	-	-	-	0.1
HCM Control Delay (s)	0	-	-	-	10.4
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Intersection	
Int Delay, s/veh	3.5

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	176	1115	5	24	68	258	310	0	0	3	0	0	372
Future Vol, veh/h	176	1115	5	24	68	258	310	0	0	3	0	0	372
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	-	None	-	-	None	-	-	None
Storage Length	295	-	120	-	325	-	380	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	2	-	-	-	-2	-	-	1	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	11	2	0	2	0	11	4	0	0	0	2	0	18
Mvmt Flow	191	1212	5	26	74	280	337	0	0	3	0	0	404

Major/Minor	Major1			Major2				Minor1			Minor2		
Conflicting Flow All	617	0	0	1212	1217	0	0	-	-	606	-	-	140
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	4.32	-	-	6.44	4.1	-	-	-	-	7	-	-	7.26
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.31	-	-	2.52	2.2	-	-	-	-	3.3	-	-	3.48
Pot Cap-1 Maneuver	900	-	-	242	580	-	-	0	0	438	0	0	834
Stage 1	-	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-			-	-						
Mov Cap-1 Maneuver	900	-	-	423	423	-	-	-	-	438	-	-	834
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.4	2.2	13.3	13.3
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	438	900	-	-	423	-	-	834
HCM Lane V/C Ratio	0.007	0.213	-	-	0.236	-	-	0.485
HCM Control Delay (s)	13.3	10.1	-	-	16.1	-	-	13.3
HCM Lane LOS	B	B	-	-	C	-	-	B
HCM 95th %tile Q(veh)	0	0.8	-	-	0.9	-	-	2.7

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	74	57	53	241	188	18
Future Vol, veh/h	74	57	53	241	188	18
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	155	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-3	-	-	-3	3	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	17	10	4	0	0
Mvmt Flow	80	62	58	262	204	20

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	592	214	224	0	-	0
Stage 1	214	-	-	-	-	-
Stage 2	378	-	-	-	-	-
Critical Hdwy	5.8	6.07	4.2	-	-	-
Critical Hdwy Stg 1	4.8	-	-	-	-	-
Critical Hdwy Stg 2	4.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.453	2.29	-	-	-
Pot Cap-1 Maneuver	521	804	1299	-	-	-
Stage 1	856	-	-	-	-	-
Stage 2	743	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	498	804	1299	-	-	-
Mov Cap-2 Maneuver	498	-	-	-	-	-
Stage 1	817	-	-	-	-	-
Stage 2	743	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.9	1.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1299	-	597	-	-
HCM Lane V/C Ratio	0.044	-	0.239	-	-
HCM Control Delay (s)	7.9	-	12.9	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.9	-	-

Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Volume (vph)	950	0	346	0	284	0	0
Future Volume (vph)	950	0	346	0	284	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Grade (%)	0%				-2%	0%	
Total Lost time (s)	6.0		6.0		4.0		
Lane Util. Factor	0.95		1.00		0.95		
Frt	1.00		1.00		1.00		
Flt Protected	1.00		0.95		1.00		
Satd. Flow (prot)	3539		1787		3575		
Flt Permitted	1.00		0.95		1.00		
Satd. Flow (perm)	3539		1787		3575		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1033	0	376	0	309	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	1033	0	376	0	309	0	0
Turn Type	NA		Prot		NA		
Protected Phases	1		2		Free		
Permitted Phases							
Actuated Green, G (s)	45.2		21.4		78.6		
Effective Green, g (s)	45.2		21.4		78.6		
Actuated g/C Ratio	0.58		0.27		1.00		
Clearance Time (s)	6.0		6.0				
Vehicle Extension (s)	3.0		3.0				
Lane Grp Cap (vph)	2035		486		3575		
v/s Ratio Prot	c0.29		c0.21		0.09		
v/s Ratio Perm							
v/c Ratio	0.51		0.77		0.09		
Uniform Delay, d1	10.0		26.4		0.0		
Progression Factor	1.00		1.00		1.00		
Incremental Delay, d2	0.9		7.5		0.0		
Delay (s)	10.9		33.9		0.0		
Level of Service	B		C		A		
Approach Delay (s)	10.9				18.6	0.0	
Approach LOS	B				B	A	

Intersection Summary			
HCM 2000 Control Delay	14.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	78.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	1.4

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Vol, veh/h	1	0	813	874	132	0	179
Future Vol, veh/h	1	0	813	874	132	0	179
Conflicting Peds, #/hr	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	-	None	-	None	-	None
Storage Length	-	300	-	-	425	-	0
Veh in Median Storage, #	-	-	0	0	-	0	-
Grade, %	-	-	3	-3	-	5	-
Peak Hour Factor	92	96	96	96	96	96	96
Heavy Vehicles, %	2	0	1	1	2	0	0
Mvmt Flow	1	0	847	910	138	0	186

Major/Minor	Major1		Major2		Minor2		
Conflicting Flow All	910	-	0	-	0	-	455
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-
Critical Hdwy	6.44	-	-	-	-	-	7.4
Critical Hdwy Stg 1	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-
Follow-up Hdwy	2.52	-	-	-	-	-	3.3
Pot Cap-1 Maneuver	379	0	-	-	-	0	524
Stage 1	-	0	-	-	-	0	-
Stage 2	-	0	-	-	-	0	-
Platoon blocked, %			-	-	-		
Mov Cap-1 Maneuver	250	-	-	-	-	-	524
Mov Cap-2 Maneuver	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	15.6
HCM LOS			C

Minor Lane/Major Mvmt	EBU	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	250	-	-	-	524
HCM Lane V/C Ratio	0.004	-	-	-	0.356
HCM Control Delay (s)	19.5	-	-	-	15.6
HCM Lane LOS	C	-	-	-	C
HCM 95th %tile Q(veh)	0	-	-	-	1.6

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	80	725	2	36	16	751	456	0	0	53	0	0	376
Future Vol, veh/h	80	725	2	36	16	751	456	0	0	53	0	0	376
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	-	None	-	-	None	-	-	None
Storage Length	295	-	120	-	325	-	380	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	2	-	-	-	-2	-	-	1	-	-	0	-
Peak Hour Factor	97	97	97	92	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	1	0	2	0	1	0	0	0	0	1	0	0
Mvmt Flow	82	747	2	39	16	774	470	0	0	55	0	0	388

Major/Minor	Major1			Major2				Minor1			Minor2		
Conflicting Flow All	1244	0	0	747	749	0	0	-	-	374	-	-	387
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	4.1	-	-	6.44	4.1	-	-	-	-	7	-	-	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	2.2	-	-	2.52	2.2	-	-	-	-	3.3	-	-	3.3
Pot Cap-1 Maneuver	567	-	-	482	869	-	-	0	0	623	0	0	617
Stage 1	-	-	-	-	-	-	-	0	0	-	0	0	-
Stage 2	-	-	-	-	-	-	-	0	0	-	0	0	-
Platoon blocked, %		-	-			-	-						
Mov Cap-1 Maneuver	567	-	-	516	516	-	-	-	-	623	-	-	617
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.2	0.5	11.3	20.2
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	623	567	-	-	516	-	-	617
HCM Lane V/C Ratio	0.088	0.145	-	-	0.108	-	-	0.628
HCM Control Delay (s)	11.3	12.4	-	-	12.8	-	-	20.2
HCM Lane LOS	B	B	-	-	B	-	-	C
HCM 95th %tile Q(veh)	0.3	0.5	-	-	0.4	-	-	4.4

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	23	51	118	306	240	79
Future Vol, veh/h	23	51	118	306	240	79
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	155	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	-3	-	-	-3	3	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	3	1	0	0	0
Mvmt Flow	25	55	128	333	261	86

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	893	304	347	0	-	0
Stage 1	304	-	-	-	-	-
Stage 2	589	-	-	-	-	-
Critical Hdwy	5.8	5.93	4.11	-	-	-
Critical Hdwy Stg 1	4.8	-	-	-	-	-
Critical Hdwy Stg 2	4.8	-	-	-	-	-
Follow-up Hdwy	3.5	3.327	2.209	-	-	-
Pot Cap-1 Maneuver	365	752	1218	-	-	-
Stage 1	792	-	-	-	-	-
Stage 2	616	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	327	752	1218	-	-	-
Mov Cap-2 Maneuver	327	-	-	-	-	-
Stage 1	709	-	-	-	-	-
Stage 2	616	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.9	2.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1218	-	536	-	-
HCM Lane V/C Ratio	0.105	-	0.15	-	-
HCM Control Delay (s)	8.3	-	12.9	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.5	-	-

Movement	EBT	EBR	WBU	WBL	WBT	NBL	NBR
Lane Configurations							
Traffic Volume (vph)	512	0	295	0	832	0	0
Future Volume (vph)	512	0	295	0	832	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Grade (%)	0%				-2%	0%	
Total Lost time (s)	6.0		6.0		4.0		
Lane Util. Factor	0.95		1.00		0.95		
Frt	1.00		1.00		1.00		
Flt Protected	1.00		0.95		1.00		
Satd. Flow (prot)	3539		1787		3575		
Flt Permitted	1.00		0.95		1.00		
Satd. Flow (perm)	3539		1787		3575		
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	557	0	321	0	904	0	0
RTOR Reduction (vph)	0	0	0	0	0	0	0
Lane Group Flow (vph)	557	0	321	0	904	0	0
Turn Type	NA		Prot		NA		
Protected Phases	1		2		Free		
Permitted Phases							
Actuated Green, G (s)	38.1		17.0		67.1		
Effective Green, g (s)	38.1		17.0		67.1		
Actuated g/C Ratio	0.57		0.25		1.00		
Clearance Time (s)	6.0		6.0				
Vehicle Extension (s)	3.0		3.0				
Lane Grp Cap (vph)	2009		452		3575		
v/s Ratio Prot	0.16		c0.18		0.25		
v/s Ratio Perm							
v/c Ratio	0.28		0.71		0.25		
Uniform Delay, d1	7.4		22.8		0.0		
Progression Factor	1.00		1.00		1.00		
Incremental Delay, d2	0.3		5.2		0.2		
Delay (s)	7.8		28.0		0.2		
Level of Service	A		C		A		
Approach Delay (s)	7.8				7.5	0.0	
Approach LOS	A				A	A	

Intersection Summary			
HCM 2000 Control Delay	7.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	67.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	40.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Appendix C

SimTraffic Queue Reports

Intersection: 1: 5th Street & Wahoo Way

Movement	SB
Directions Served	R
Maximum Queue (ft)	53
Average Queue (ft)	26
95th Queue (ft)	45
Link Distance (ft)	211
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: 5th Street & Old Lynchburg Road

Movement	EB	EB	EB	EB	WB	WB	NB	SB	SB
Directions Served	L	T	T	R	UL	R	R	LT	R
Maximum Queue (ft)	133	2	0	0	54	35	31	255	428
Average Queue (ft)	45	0	0	0	19	2	3	249	399
95th Queue (ft)	95	2	0	0	41	15	17	288	527
Link Distance (ft)		913	913						413
Upstream Blk Time (%)									79
Queuing Penalty (veh)									195
Storage Bay Dist (ft)	295			120	325	380	350	255	
Storage Blk Time (%)								89	75
Queuing Penalty (veh)								23	258

Intersection: 5: Old Lynchburg Road & Country Green Rd

Movement	EB	NB	SB
Directions Served	LR	L	TR
Maximum Queue (ft)	386	36	290
Average Queue (ft)	330	3	253
95th Queue (ft)	497	20	391
Link Distance (ft)	375		275
Upstream Blk Time (%)	82		79
Queuing Penalty (veh)	0		0
Storage Bay Dist (ft)		155	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 476

Intersection: 1: 5th Street & Wahoo Way

Movement	SB
Directions Served	R
Maximum Queue (ft)	111
Average Queue (ft)	47
95th Queue (ft)	81
Link Distance (ft)	211
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: 5th Street & Old Lynchburg Road

Movement	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	UL	T	R	LT	R	LT	R
Maximum Queue (ft)	124	3	40	2	30	19	53	255	430
Average Queue (ft)	37	0	8	0	1	1	28	250	401
95th Queue (ft)	92	2	25	1	10	9	50	279	524
Link Distance (ft)		913		751		536			413
Upstream Blk Time (%)									78
Queuing Penalty (veh)									228
Storage Bay Dist (ft)	295		325		380		350	255	
Storage Blk Time (%)								93	75
Queuing Penalty (veh)								75	220

Intersection: 5: Old Lynchburg Road & Country Green Rd

Movement	EB	NB	SB
Directions Served	LR	L	TR
Maximum Queue (ft)	390	62	290
Average Queue (ft)	317	9	261
95th Queue (ft)	503	37	390
Link Distance (ft)	375		275
Upstream Blk Time (%)	68		87
Queuing Penalty (veh)	0		0
Storage Bay Dist (ft)		155	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Zone Summary

Zone wide Queuing Penalty: 523

Intersection: 1: 5th Street & Wahoo Way

Movement	SB
Directions Served	R
Maximum Queue (ft)	55
Average Queue (ft)	27
95th Queue (ft)	44
Link Distance (ft)	253
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: 5th Street & Old Lynchburg Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	SB	SB
Directions Served	L	T	T	R	UL	T	T	R	R	LT	R
Maximum Queue (ft)	132	184	180	19	80	127	104	118	31	226	52
Average Queue (ft)	59	96	69	1	29	49	21	38	3	123	10
95th Queue (ft)	108	155	133	12	58	99	67	82	18	201	33
Link Distance (ft)		913	913			750	750				408
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	295			120	325			380	350	255	
Storage Blk Time (%)			1	0						0	
Queuing Penalty (veh)			0	0						0	

Intersection: 5: Old Lynchburg Road & Country Green Rd

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (ft)	102	48
Average Queue (ft)	46	10
95th Queue (ft)	78	37
Link Distance (ft)	373	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		155
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 0

Intersection: 1: 5th Street & Wahoo Way

Movement	SB
Directions Served	R
Maximum Queue (ft)	113
Average Queue (ft)	48
95th Queue (ft)	85
Link Distance (ft)	253
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: 5th Street & Old Lynchburg Road

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	UL	T	T	R	LT	R	LT	R
Maximum Queue (ft)	99	122	73	2	54	221	184	120	20	60	224	116
Average Queue (ft)	32	50	24	0	17	106	72	51	1	27	103	29
95th Queue (ft)	71	95	58	1	40	183	151	96	8	52	179	75
Link Distance (ft)		913	913			750	750		536			408
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	295			120	325			380		350	255	
Storage Blk Time (%)			0								0	0
Queuing Penalty (veh)			0								0	0

Intersection: 5: Old Lynchburg Road & Country Green Rd

Movement	EB	NB	SB
Directions Served	LR	L	TR
Maximum Queue (ft)	78	90	17
Average Queue (ft)	34	26	1
95th Queue (ft)	63	63	7
Link Distance (ft)	373		280
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		155	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Intersection: 1: 5th Street & Wahoo Way

Movement	SB
Directions Served	R
Maximum Queue (ft)	59
Average Queue (ft)	27
95th Queue (ft)	46
Link Distance (ft)	270
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 3: 5th Street & Old Lynchburg Road

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	L	T	UL	T	R	R	R
Maximum Queue (ft)	153	1	86	3	44	27	187
Average Queue (ft)	54	0	31	0	5	3	78
95th Queue (ft)	115	1	64	3	22	18	135
Link Distance (ft)		902		758		538	408
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	295		325		380		
Storage Blk Time (%)	0						
Queuing Penalty (veh)	0						

Intersection: 5: Old Lynchburg Road & Country Green Rd

Movement	EB	NB	SB
Directions Served	LR	L	TR
Maximum Queue (ft)	98	60	2
Average Queue (ft)	45	12	0
95th Queue (ft)	77	41	2
Link Distance (ft)	391		280
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		155	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 99: 5th Street

Movement	EB	EB	WB
Directions Served	T	T	U
Maximum Queue (ft)	282	240	263
Average Queue (ft)	148	92	159
95th Queue (ft)	243	194	240
Link Distance (ft)	785	785	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			800
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Intersection: 1: 5th Street & Wahoo Way

Movement	EB	SB
Directions Served	U	R
Maximum Queue (ft)	5	111
Average Queue (ft)	0	46
95th Queue (ft)	4	82
Link Distance (ft)		257
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	300	
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 3: 5th Street & Old Lynchburg Road

Movement	EB	WB	WB	NB	SB
Directions Served	L	UL	R	R	R
Maximum Queue (ft)	125	55	37	65	177
Average Queue (ft)	38	17	4	27	72
95th Queue (ft)	90	40	20	51	133
Link Distance (ft)				538	416
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	295	325	380		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 5: Old Lynchburg Road & Country Green Rd

Movement	EB	NB	SB
Directions Served	LR	L	TR
Maximum Queue (ft)	76	66	19
Average Queue (ft)	31	24	1
95th Queue (ft)	56	52	7
Link Distance (ft)	338		276
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		155	
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 99: 5th Street

Movement	EB	EB	WB
Directions Served	T	T	U
Maximum Queue (ft)	165	108	218
Average Queue (ft)	78	27	122
95th Queue (ft)	134	73	194
Link Distance (ft)	781	781	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			600
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 0

Appendix D

Roundabout Mitigation

Traffic Performance Report

DELAY (CONTROL)

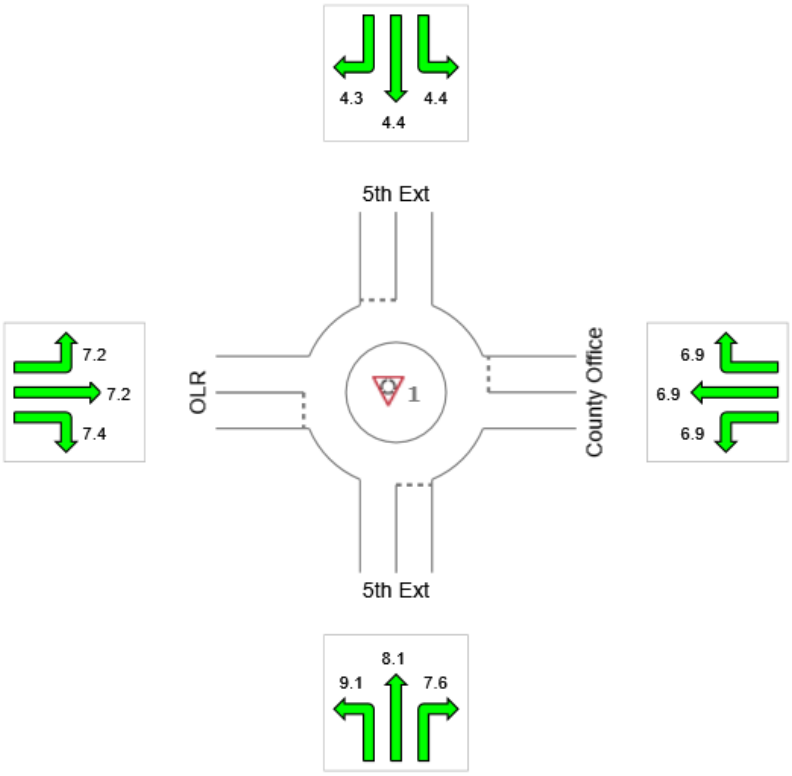
Average control delay per vehicle, or average pedestrian delay (seconds)

Site: 1 [5th Business Campus 2024 AM]

2024 AM
Site Category: (None)
Roundabout

All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Delay (Control)	8.2	6.9	4.3	7.2	6.8
LOS	A	A	A	A	A



Colour code based on Level of Service

LOS A	LOS B	LOS C	LOS D	LOS E	LOS F

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Roundabout Level of Service Method: Same as Signalised Intersections
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

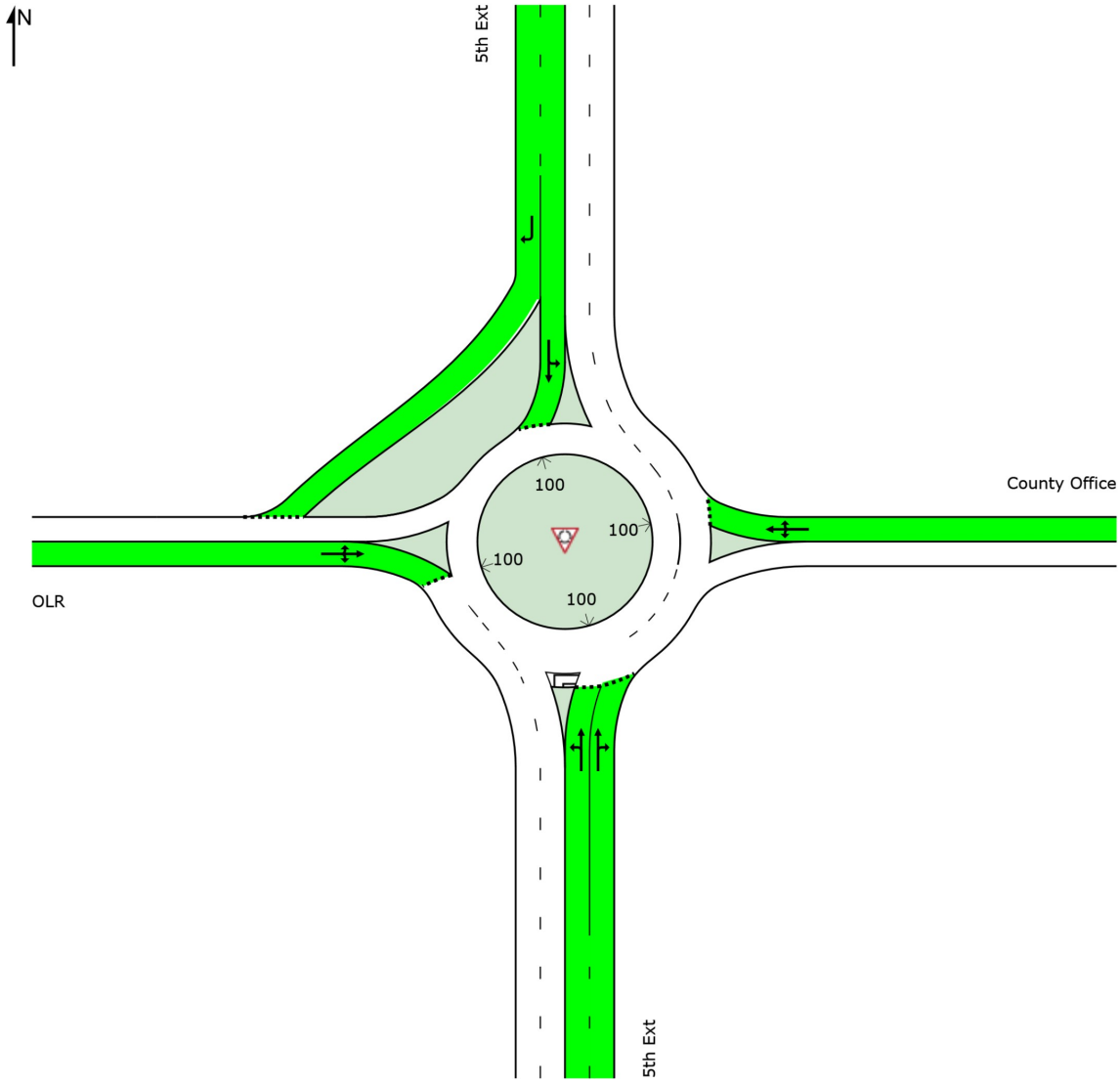
QUEUE DISTANCE (%ILE)

95% Back of Queue Distance per lane (feet)

Site: 1 [5th Business Campus 2024 AM]

2024 AM
Site Category: (None)
Roundabout

	Approaches				Intersection
	South	East	North	West	
Vehicle Queue (%ile)	94	1	42	65	94



Colour code based on Queue Storage Ratio

[< 0.6]	[0.6 – 0.7]	[0.7 – 0.8]	[0.8 – 0.9]	[0.9 – 1.0]	[> 1.0]

DELAY (CONTROL)

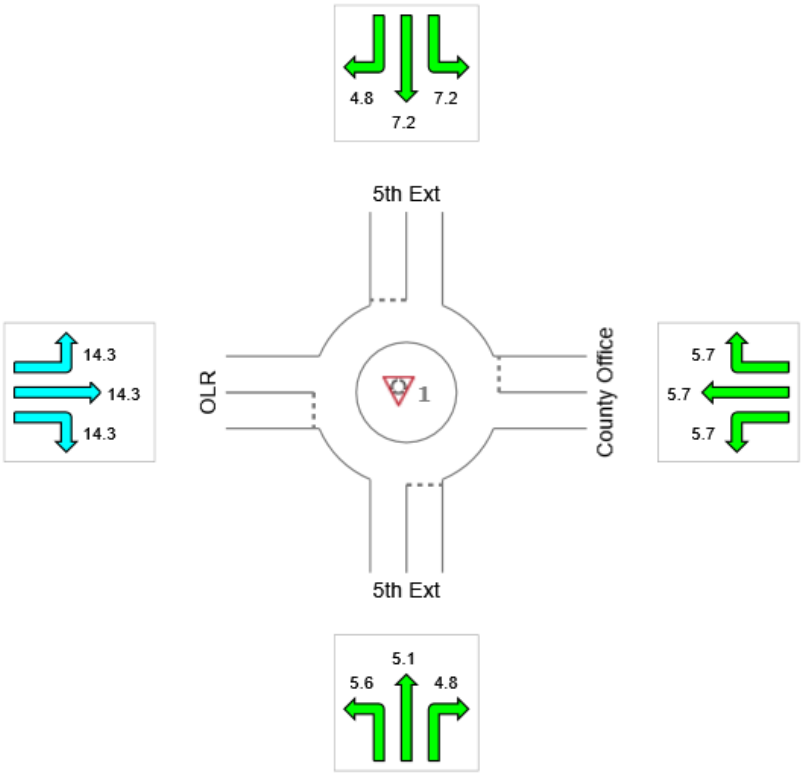
Average control delay per vehicle, or average pedestrian delay (seconds)

Site: 1 [5th Business Campus 2024 PM]

2024 PM
Site Category: (None)
Roundabout

All Movement Classes

	Approaches				Intersection
	South	East	North	West	
Delay (Control)	5.1	5.7	6.3	14.3	7.4
LOS	A	A	A	B	A



Colour code based on Level of Service

LOS A | LOS B | LOS C | LOS D | LOS E | LOS F

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Roundabout Level of Service Method: Same as Signalised Intersections
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

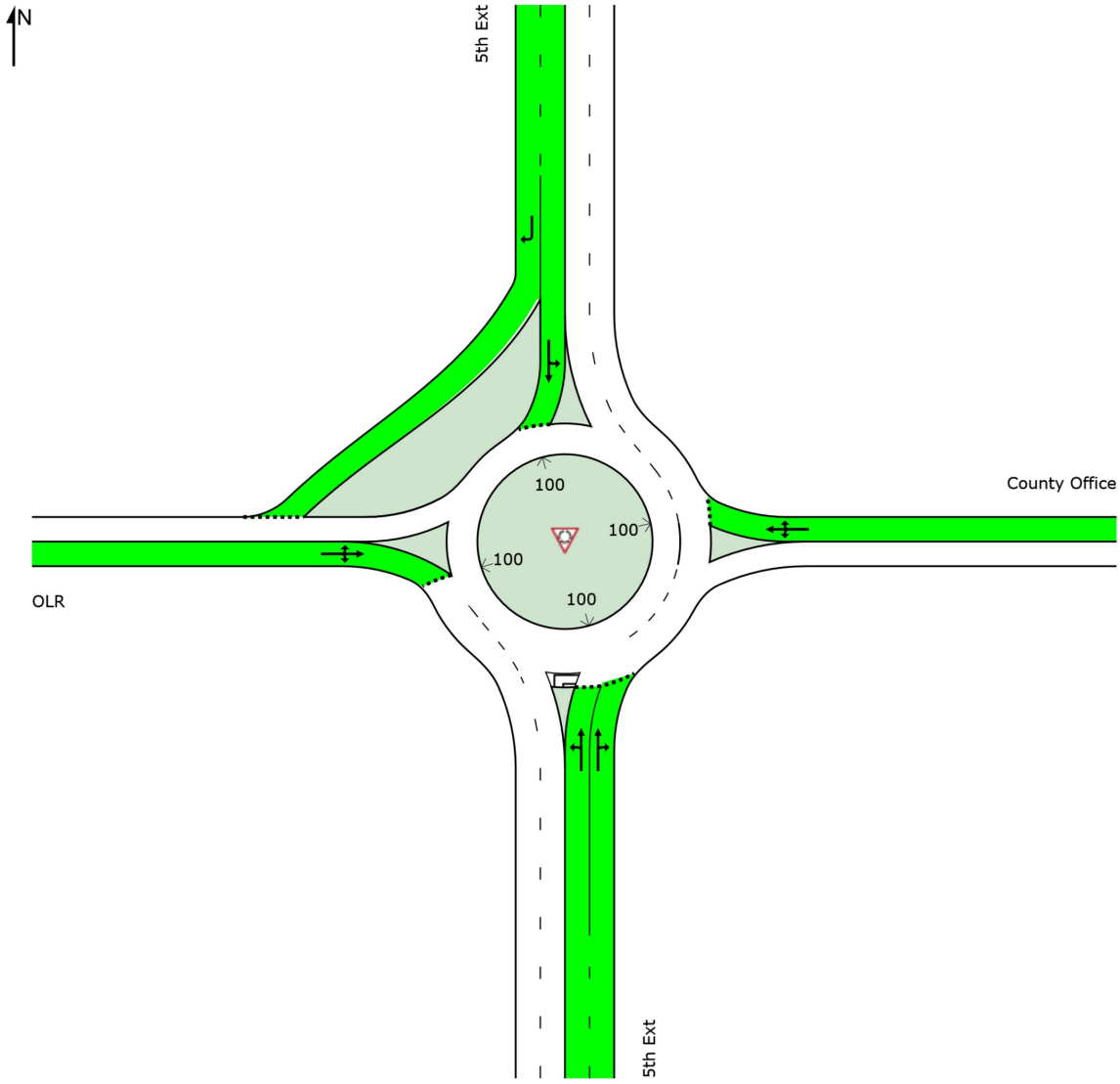
QUEUE DISTANCE (%ILE)

95% Back of Queue Distance per lane (feet)

Site: 1 [5th Business Campus 2024 PM]

2024 PM
Site Category: (None)
Roundabout

	Approaches				Intersection
	South	East	North	West	
Vehicle Queue (%ile)	43	8	122	149	149



Colour code based on Queue Storage Ratio

[< 0.6] [0.6 – 0.7] [0.7 – 0.8] [0.8 – 0.9] [0.9 – 1.0] [> 1.0]