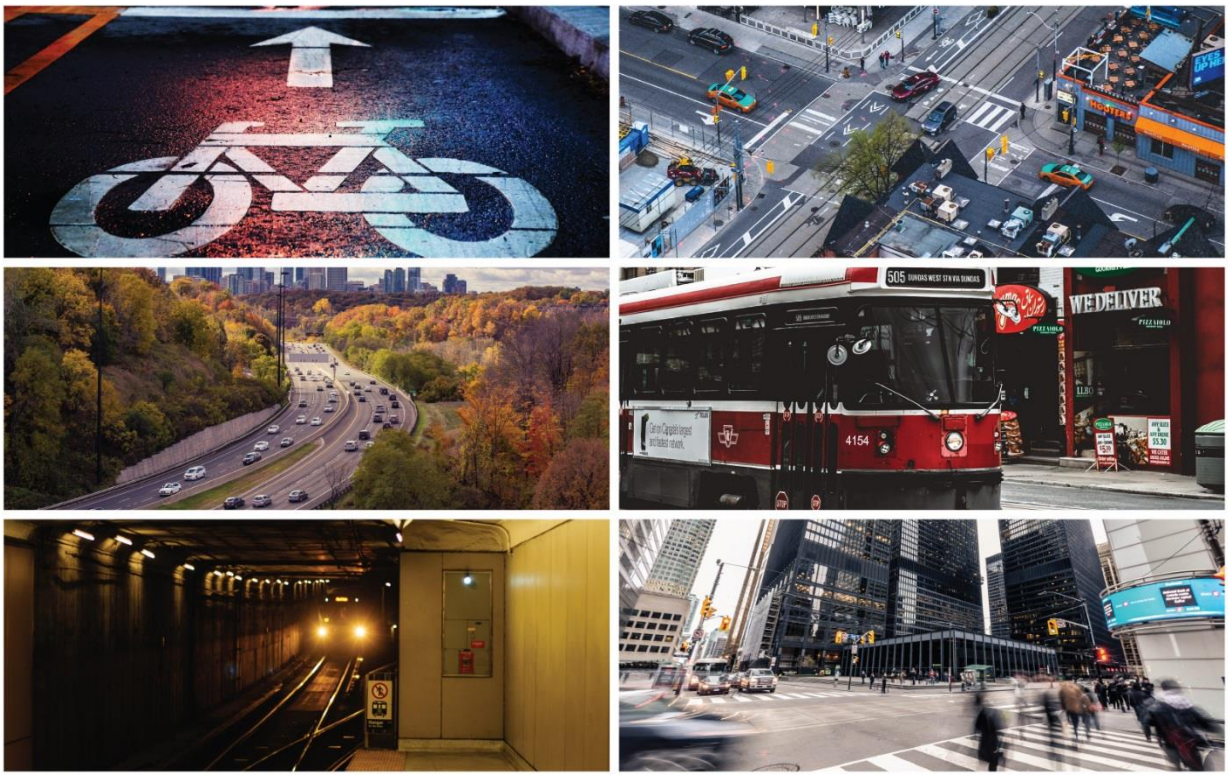
CITY OF SARNIA

RAPIDS PARKWAY EXTENSION

TRAFFIC STUDY UPDATE

OCTOBER 11, 2019



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RAPIDS PARKWAY EXTENSION

TRAFFIC STUDY UPDATE

CITY OF SARNIA

PROJECT NO.: 19M-00714-00
DATE: OCTOBER 2019

WSP
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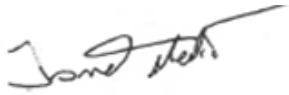

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1 INTRODUCTION

WSP Group was retained to investigate a potential change to the extent and timing of the planned Rapids Parkway extension in Sarnia, Ontario. By way of background, WSP had previously prepared a traffic study entitled "Rapids Parkway Extension Traffic Study" dated October 2017. Since the submission of the previous study, the City of Sarnia has expressed interest in modifying The Rapids Parkway extension. For context, the original Rapids Parkway Extension can be seen in **Figure 1-1**, where the Rapids Parkway extends to Exmouth Street, including a connection to Quinn Drive.

Figure 1-1: Full Extension of the Rapids Parkway

This report assesses the following items associated with the proposed changes to the Rapids Parkway extension:

- What is the traffic operational impact of having the extension terminate at Quinn Drive instead of Exmouth Street;
- At what point is the extension necessary to support the planned developments in the area; and
- Can a roundabout serve the capacity needs of the intersections of Quinn Drive at Rapids Parkway, and Quinn Drive at Lambton Mall Road, in either the original alignment or the reduced alignment.

2 ANALYSIS OF REDUCED EXTENSION

To analyze the impact of reducing the extension of Rapids Parkway to Quinn Drive (as shown in **Figure 2-1**), a new scenario was added to the traffic model used for the original study. This scenario involved redirecting trips assigned to use the previously proposed portion of the Rapids Parkway between Quinn Drive and Exmouth Street to instead use Quinn Drive as well as either Lambton Mall Road or Barclay Drive to access Exmouth Street. The redirecting of trips at each applicable intersection is shown in **Figure 2-2**.

Figure 2-1: Reduced Extension of the Rapids Parkway

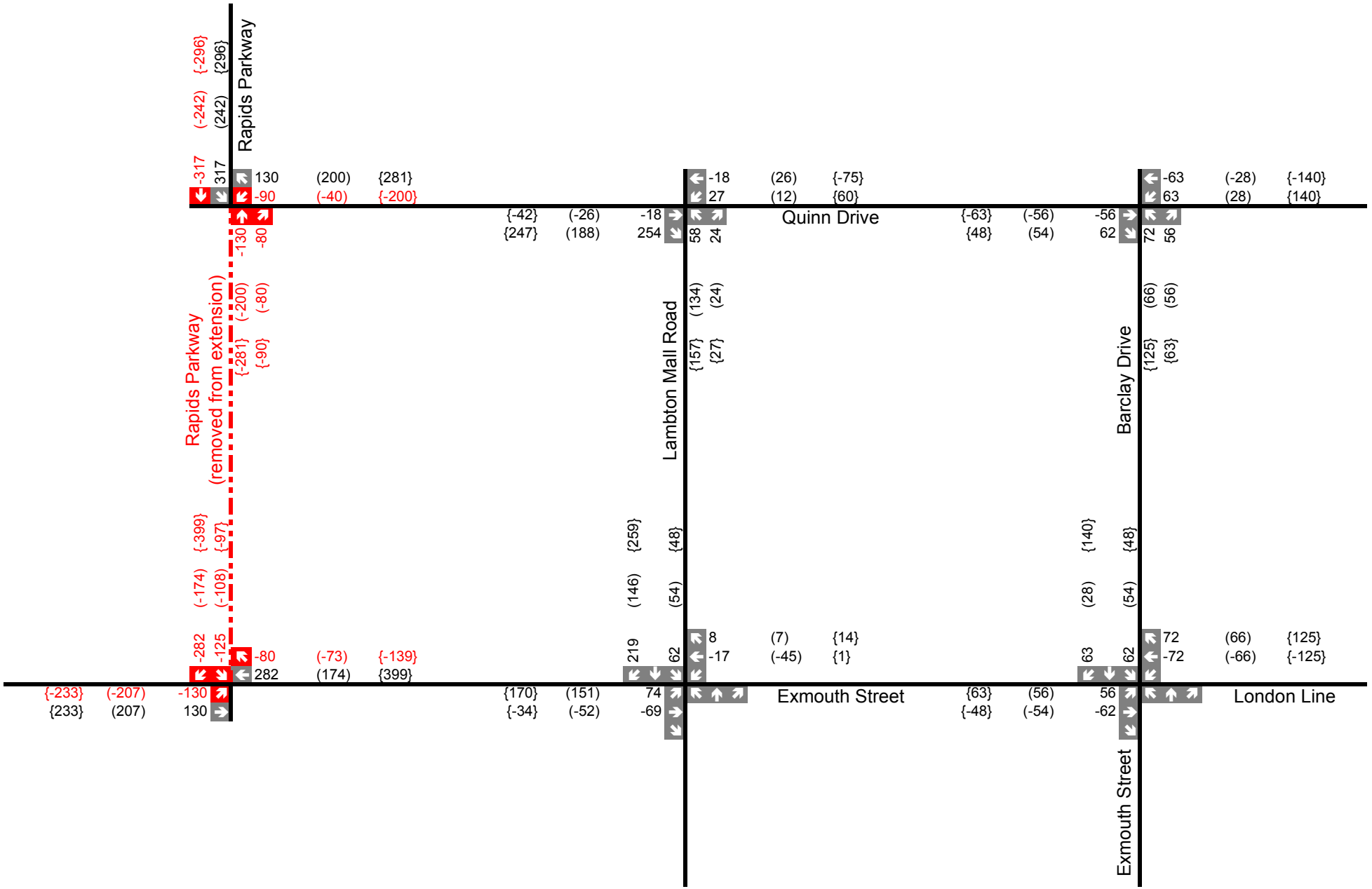
Other items that change in this alternative are the lane configurations and traffic control at several intersections, namely:

— The intersection of Rapids Parkway & Exmouth Street no longer exists;
— The intersection of Rapids Parkway & Quinn Drive is an elbow curve instead of a signalized T-intersection; and
— The intersection of Quinn Drive & Lambton Mall Road is a roundabout instead of a signalized intersection.

The lane configurations of these intersections as well as the intersection of Lambton Mall Road & Exmouth Street with a full and reduced extension are shown in **Figure 2-3** and **Figure 2-4** respectively. For the intersection of Lambton Mall Road & Exmouth Street, consideration was also given towards replacing the north-south split signal phasing currently in use with a standard protected-permissive left turn phasing scheme. Such a change would involve making some modifications to the northbound and southbound lane configurations, as shown in both lane configuration figures and detailed in **Section 2.1**. The performance of this intersection was assessed separately with and without the split phasing for both the full extension and reduced extension scenarios as the split phasing could be removed independently from the decision on the Rapids Parkway extension.

The operation of the study intersections was analyzed using Highway Capacity Manual (HCM) methodology and Synchro 10.0 software. The proposed roundabout at Quinn Drive & Lambton Mall Road was analyzed using Sidra Intersection 6.1 software. The analysis follows the same assumptions as in the original study unless otherwise stated.

A summary of intersection LOS, delay, and V/C ratios under both scenarios for the AM, PM and Saturday peak hours is provided in **Table 2-1**, **Table 2-2**, and **Table 2-3** respectively. Level of service (LOS) definitions are provided in **Appendix A** and intersection capacity and queue analysis reports are provided in **Appendix B**.



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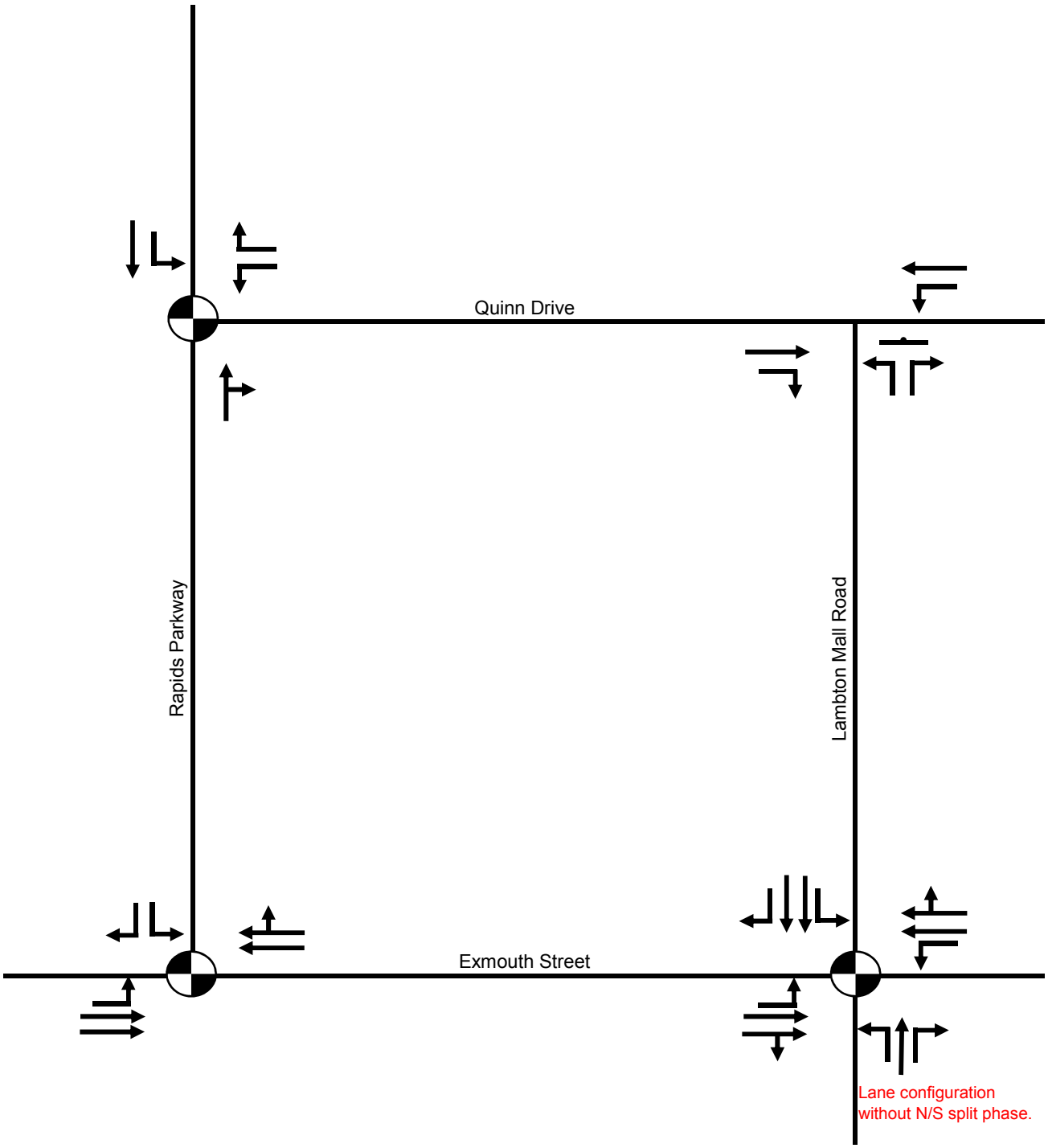
xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

{xx} Saturday Peak Hour Traffic Volumes

Figure 2-2

Volumes Redirected from Reduced Rapids Extension



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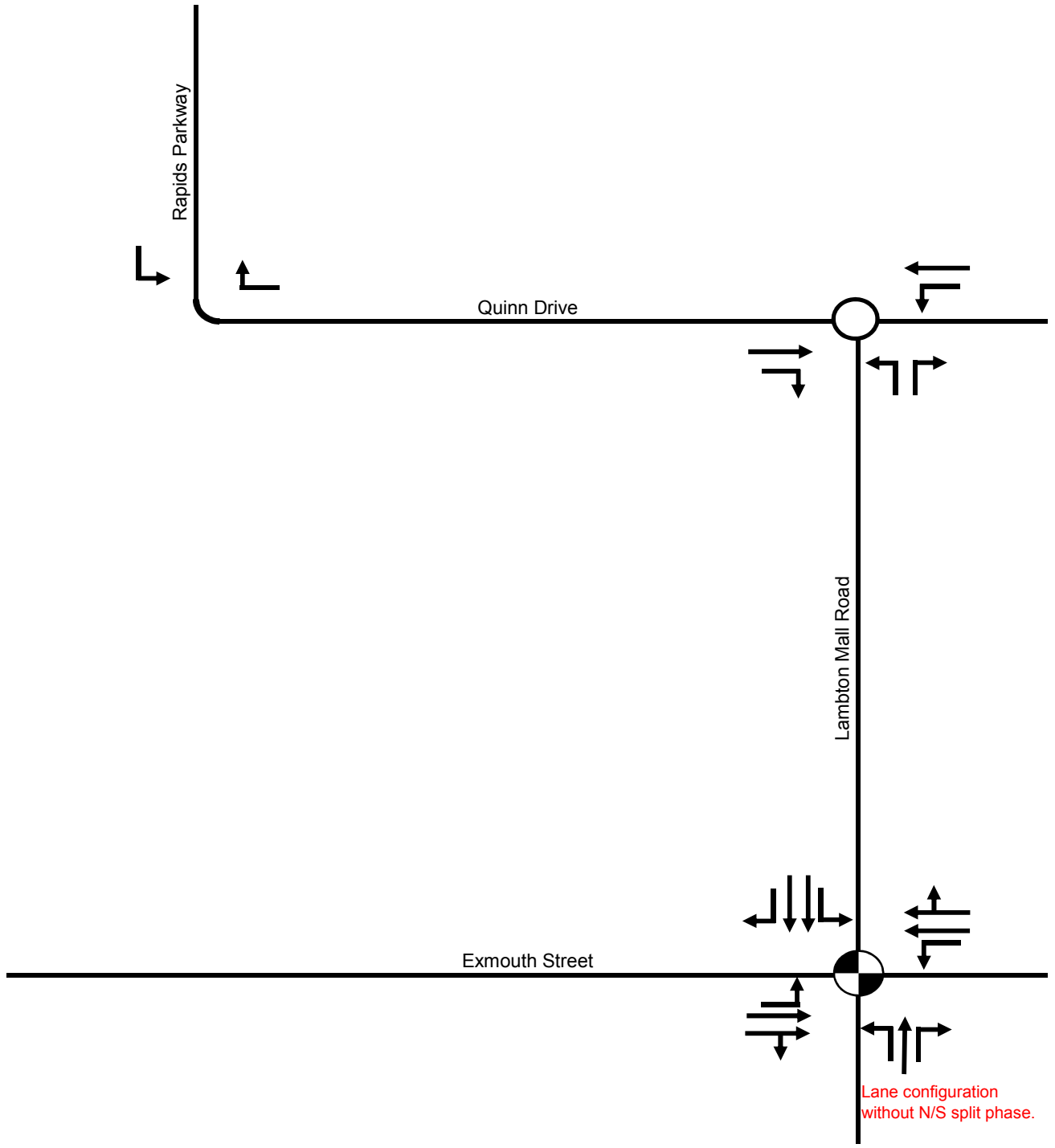
Signalized Intersection

Stop-controlled Approach

Roundabout

Figure 2-3
Lane Configuration with Full Extension



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Signalized Intersection

Stop-controlled Approach

Roundabout

Figure 2-4
Lane Configuration with Reduced Extension

Table 2-1: Future (2027) Total AM Traffic Conditions

Intersection	Movement	Full Rapids Parkway Extension			Partial Rapids Parkway Extension		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Lambton Mall Road / Home Depot Driveway & Quinn Drive[1]	**Overall**	**0.54**	**19**	**B**	**0.51**	**9**	**A**
	EBT	0.45	17	B	0.52	10	A
	EBR	0.06	14	B			
	WBL	0.84	36	D	0.43	9	A
	WBTR	0.20	15	B			
	NBTL	0.31	13	B	0.35	8	A
	NBR	0.16	11	B			
Lambton Mall Road & Exmouth Street	**Overall**	**0.69**	**40**	**D**	**0.62**	**44**	**D**
	EBL	0.54	32	C	0.68	38	D
	EBTR	0.84	51	D	0.64	47	D
	WBL	0.67	65	E	0.57	42	D
	WBTR	0.66	20	C	0.76	56	E
	NBL	0.44	37	D	0.43	41	D
	NBTL	0.82	52	D	0.80	56	E
	NBR	0.08	33	C	0.07	37	D
	SBL	0.18	31	C	0.26	32	C
	SBT	0.48	37	D	0.39	35	C
	SBR	0.11	31	C	0.24	32	C
Lambton Mall Road & Exmouth Street (without split phase)[2]	**Overall**	**0.51**	**27**	**C**	**0.47**	**33**	**C**
	EBL	0.50	31	C	0.63	35	C
	EBTR	0.78	46	D	0.61	45	D
	WBL	0.59	58	E	0.52	39	D
	WBTR	0.53	8	A	0.72	53	D
	NBL	0.35	15	B	0.28	15	B
	NBT	0.33	15	B	0.36	23	C
	NBR	0.09	13	B	0.07	19	B
	SBL	0.23	26	C	0.26	16	B
	SBT	0.36	27	C	0.14	21	C
	SBR	0.11	24	C	0.24	22	C
Barclay Drive & Quinn Drive	**Overall**	**0.39**	**16**	**B**	**0.43**	**17**	**B**
	EBT	0.42	16	B	0.37	18	B
	EBR	0.07	12	B	0.11	15	B
	WBL	0.33	8	A	0.37	8	A
	WBTR	0.23	7	A	0.17	7	A
	NBTL	0.36	30	C	0.51	29	C
	NBR	0.14	28	C	0.16	25	C

Table 2-1: Future (2027) Total AM Traffic Conditions

Intersection	Movement	Full Rapids Parkway Extension			Partial Rapids Parkway Extension		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Barclay Drive & Exmouth Street / London Line	**Overall**	**0.41**	**43**	**D**	**0.44**	**29**	**C**
	EBL	0.36	39	D	0.45	30	C
	EBTR	0.36	37	D	0.28	29	C
	WBL	0.38	44	D	0.38	42	D
	WBT	0.68	47	D	0.62	44	D
	WBR	0.13	113	F	0.17	39	D
	NBTL	0.10	11	B	0.09	11	B
	SBTL	0.29	12	B	0.35	13	B
	SBR	0.05	10	B	0.08	10	B
Rapids Parkway & Quinn Drive	**Overall**	**0.34**	**11**	**B**			
	WBL	0.45	34	C			
	WBR	0.09	31	C			
	NBTR	0.16	4	A			
	SBL	0.33	5	A			
	SBT	0.25	4	A			
Rapids Parkway & Exmouth Street	**Overall**	**0.51**	**18**	**B**			
	EBL	0.84	48	D			
	EBT	0.54	17	B			
	WBTR	0.63	18	B			
	SBL	0.17	11	B			
	SBR	0.25	12	B			

[1]In the partial extension the intersection is a roundabout, and the results were combined on a per-approach basis. Additionally, the southbound direction of travel had a negligible number of vehicles and the results are not presented.

[2]The lane configuration adjustments to the southbound approach lanes detailed in section 2.1 were only applied to the partial extension model.

Table 2-2: Future (2027) Total PM Traffic Conditions

Intersection	Movement	Full Rapids Parkway Extension			Partial Rapids Parkway Extension		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Lambton Mall Road / Home Depot Driveway & Quinn Drive[1]	**Overall**	**0.62**	**16**	**B**	**0.59**	**10**	**A**
	EBT	0.24	10	A	0.50	10	B
	EBR	0.08	9	A			
	WBL	0.83	24	C	0.59	11	B
	WBTR	0.28	10	B			
	NBTL	0.31	19	B	0.38	7	A
	NBR	0.19	17	B			
Lambton Mall Road & Exmouth Street	**Overall**	**0.87**	**47**	**D**	**0.87**	**54**	**D**
	EBL	0.67	35	C	0.90	55	E
	EBTR	0.89	53	D	0.79	47	D
	WBL	0.91	90	F	0.87	59	E
	WBTR	0.67	17	B	0.90	63	E
	NBL	0.83	57	E	0.83	61	E
	NBTL	0.87	63	E	0.87	67	E
	NBR	0.25	37	D	0.16	40	D
	SBL	0.72	56	E	0.56	46	D
	SBT	0.73	50	D	0.73	52	D
	SBR	0.30	37	D	0.51	45	D
Lambton Mall Road & Exmouth Street (without split phase)[2]	**Overall**	**0.81**	**35**	**C**	**0.76**	**40**	**D**
	EBL	0.60	29	C	0.86	48	D
	EBTR	0.88	51	D	0.74	44	D
	WBL	0.85	75	E	0.82	48	D
	WBTR	0.70	14	B	0.85	56	E
	NBL	0.70	25	C	0.61	25	C
	NBT	0.32	18	B	0.48	36	D
	NBR	0.15	16	B	0.16	31	C
	SBL	0.60	44	D	0.51	25	C
	SBT	0.64	42	D	0.30	33	C
	SBR	0.20	32	C	0.33	35	C
Barclay Drive & Quinn Drive	**Overall**	**0.61**	**17**	**B**	**0.66**	**20**	**B**
	EBT	0.44	17	B	0.50	24	C
	EBR	0.06	13	B	0.10	19	B
	WBL	0.57	10	B	0.59	12	B
	WBTR	0.41	9	A	0.41	10	B
	NBTL	0.60	34	C	0.71	35	C
	NBR	0.15	27	C	0.27	25	C

Table 2-2: Future (2027) Total PM Traffic Conditions

Intersection	Movement	Full Rapids Parkway Extension			Partial Rapids Parkway Extension		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Barclay Drive & Exmouth Street / London Line	**Overall**	**0.64**	**41**	**D**	**0.71**	**31**	**C**
	EBL	0.46	32	C	0.71	35	D
	EBTR	0.49	31	C	0.51	28	C
	WBL	0.34	43	D	0.38	38	D
	WBT	0.73	49	D	0.79	46	D
	WBR	0.13	126	F	0.18	36	D
	NBTL	0.32	18	B	0.29	15	B
	SBTL	0.56	21	C	0.62	20	B
	SBR	0.07	15	B	0.09	13	B
Rapids Parkway & Quinn Drive	**Overall**	**0.27**	**12**	**B**			
	WBL	0.19	26	C			
	WBR	0.21	26	C			
	NBTR	0.24	4	A			
	SBL	0.28	5	A			
	SBT	0.20	4	A			
Rapids Parkway & Exmouth Street	**Overall**	**0.61**	**20**	**B**			
	EBL	0.60	21	C			
	EBT	0.41	8	A			
	WBTR	0.81	27	C			
	SBL	0.28	30	C			
	SBR	0.12	28	C			

[1]In the partial extension the intersection is a roundabout, and the results were combined on a per-approach basis. Additionally, the southbound direction of travel had a negligible number of vehicles and the results are not presented.

[2]The lane configuration adjustments to the southbound approach lanes detailed in section 2.1 were only applied to the partial extension model.

Table 2-3: Future (2027) Total Saturday Traffic Conditions

Intersection	Movement	Full Rapids Parkway Extension			Partial Rapids Parkway Extension		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Lambton Mall Road / Home Depot Driveway & Quinn Drive[1]	**Overall**	**0.63**	**16**	**B**	**0.74**	**15**	**B**
	EBT	0.38	12	B	0.74	18	B
	EBR	0.14	10	B			
	WBL	0.83	27	C	0.74	17	B
	WBTR	0.48	13	B			
	NBTL	0.37	18	B	0.51	10	B
	NBR	0.23	16	B			
Lambton Mall Road & Exmouth Street	**Overall**	**0.95**	**56**	**E**	**1.06**	**74**	**E**
	EBL	0.92	63	E	1.09	108	F
	EBTR	0.97	63	E	0.81	45	D
	WBL	0.85	78	E	0.82	51	D
	WBTR	0.91	35	C	1.09	107	F
	NBL	0.86	59	E	0.90	70	E
	NBTL	0.97	79	E	1.01	98	F
	NBR	0.33	37	D	0.26	40	D
	SBL	0.60	45	D	0.77	59	E
	SBT	0.89	66	E	0.93	77	E
	SBR	0.12	35	D	0.63	52	D
Lambton Mall Road & Exmouth Street (without split phase)[2]	**Overall**	**0.91**	**44**	**D**	**0.93**	**50**	**D**
	EBL	0.88	53	D	0.98	73	E
	EBTR	0.97	63	E	0.69	36	D
	WBL	0.85	76	E	0.74	41	D
	WBTR	0.94	32	C	1.01	81	F
	NBL	0.80	31	C	0.78	35	D
	NBT	0.37	18	B	0.67	46	D
	NBR	0.19	16	B	0.24	36	D
	SBL	0.83	62	E	0.78	41	D
	SBT	0.72	45	D	0.42	40	D
	SBR	0.11	31	C	0.40	41	D
Barclay Drive & Quinn Drive	**Overall**	**0.67**	**18**	**B**	**0.87**	**28**	**C**
	EBT	0.58	19	B	0.69	32	C
	EBR	0.07	12	B	0.10	21	C
	WBL	0.70	15	B	0.86	27	C
	WBTR	0.47	9	A	0.36	9	A
	NBTL	0.49	31	C	0.80	45	D
	NBR	0.34	29	C	0.54	31	C

Table 2-3: Future (2027) Total Saturday Traffic Conditions

Intersection	Movement	Full Rapids Parkway Extension			Partial Rapids Parkway Extension		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Barclay Drive & Exmouth Street / London Line	**Overall**	**0.73**	**43**	**D**	**0.81**	**31**	**C**
	EBL	0.57	34	C	0.86	50	D
	EBTR	0.50	31	C	0.54	28	C
	WBL	0.53	42	D	0.62	45	D
	WBT	0.77	46	D	0.77	44	D
	WBR	0.18	138	F	0.26	35	D
	NBTL	0.39	21	C	0.34	16	B
	SBTL	0.68	27	C	0.69	23	C
	SBR	0.10	17	B	0.20	15	B
Rapids Parkway & Quinn Drive	**Overall**	**0.56**	**16**	**B**			
	WBL	0.70	40	D			
	WBR	0.16	30	C			
	NBTR	0.31	6	A			
	SBL	0.53	10	A			
	SBT	0.25	6	A			
Rapids Parkway & Exmouth Street	**Overall**	**0.68**	**23**	**C**			
	EBL	0.67	27	C			
	EBT	0.49	10	A			
	WBTR	0.83	30	C			
	SBL	0.25	31	C			
	SBR	0.43	35	C			

[1]In the partial extension the intersection is a roundabout, and the results were combined on a per-approach basis. Additionally, the southbound direction of travel had a negligible number of vehicles and the results are not presented.

[2]The lane configuration adjustments to the southbound approach lanes detailed in section 2.1 were only applied to the partial extension model.

As part of the analysis of the reduced extension scenario, the phasing splits were optimized in Synchro for all signalized intersections studied to adjust for the relative changes in intersection movement volumes caused by the traffic redirection. Additionally, the cycle length of the intersection of Lambton Mall Road & Exmouth Street was increased from 110 to 120 seconds as without this increase there were capacity constraints during the Saturday peak hour.

The capacity analysis shows that the reduced extension is most problematic towards the intersection of Lambton Mall Road & Exmouth Street (operating above capacity during the Saturday peak hour) due to a substantial amount of left-turning traffic being redirected there.

Under forecasted conditions with the split phasing at Lambton Mall Road & Exmouth Street removed, there are no intersections operating over-capacity either with or without reducing the extension. However, with the reduced extension there are several movements approaching capacity and with long delays. Overall, conditions

at the intersection of Lambton Mall Road & Exmouth Street as well as along Quinn Drive are generally better with the full extension in place. As such, while the reduced extension is operationally feasible, it may pose problems for people seeking to access the existing and proposed retail establishments in the area along Quinn Drive.

2.1 RECOMMENDED CONFIGURATION OF EXMOUTH STREET AND LAMBTON MALL ROAD

Based on the results detailed above, it is expected that removing the north-south split signal configuration currently existing at the intersection of Exmouth Street and Lambton Mall Road would improve traffic conditions at the intersection for both scenarios studied. As such, it is recommended that the split signal be replaced with a standard protected-permissive left turn phasing scheme regardless of what option is chosen for the Rapids Parkway extension.

To eliminate the split signal, the changes to the lane configurations of the northbound and southbound approaches shown in **Figure 2-5** need to be made. The northbound approach currently features a left turn lane, a through-left lane, and a right turn lane. As multiple turning lanes cannot safely exist for permissive movements, the through-left lane has been replaced with a through-only lane.

It is also necessary to have the northbound and southbound left turn lanes aligned with each other. Based on the preliminary check shown in **Figure 2-5** with red dashed lines, it appears that it may be feasible to make the southbound left turning lane align with the currently existing northbound left turning lane by making the current southbound left lane a through lane and converting the currently hatched area (to the east of it) to a new southbound left lane (with a storage length of about 60 metres). It is believed that shorter lengths of both the southbound left lane and the second northbound lane to the north of the intersection do not substantially alter anticipated traffic conditions. Meanwhile, the addition of a second southbound through lane is expected to substantially improve anticipated conditions for that movement as well as for the northbound left movement at that intersection.

While the proposed lane configurations appear to be feasible without requiring additional property from a traffic operations standpoint, there would need to be a functional design completed to ensure it could be accommodated within the existing ROW.

Figure 2-5: Recommended Lane Configuration of Exmouth Street and Lambton Mall Road

3 IDENTIFICATION OF TRIGGER POINT

To help identify the trigger point at which the Rapids Parkway extension would be needed, an analysis of an interim 2024 horizon was performed. This analysis was done under the assumption that the developments included in the original analysis (shown in **Figure 3-1**) would each be 50% occupied by that point in time. The Rapids Parkway Residential Subdivision (indicated in yellow in **Figure 3-1**) was assumed to be 100% occupied given that a portion of the units were already occupied at the time of the original study.

Figure 3-1: Developments Included in Original Study

The analysis of this interim horizon involved the comparison of two scenarios: one scenario with the reduced Rapids Parkway extension being in place and one scenario without the extension. For the scenario with the reduced extension, trips assigned per the original study to use the previously proposed portion of Rapids Parkway between Quinn Drive and Exmouth Street were redirected to use other roads in a similar manner as was done for the reduced extension scenario in **Section 2** of this report. For the scenario with no extension, trips assigned per the original study to use the extension were redirected primarily via Modeland Road, London

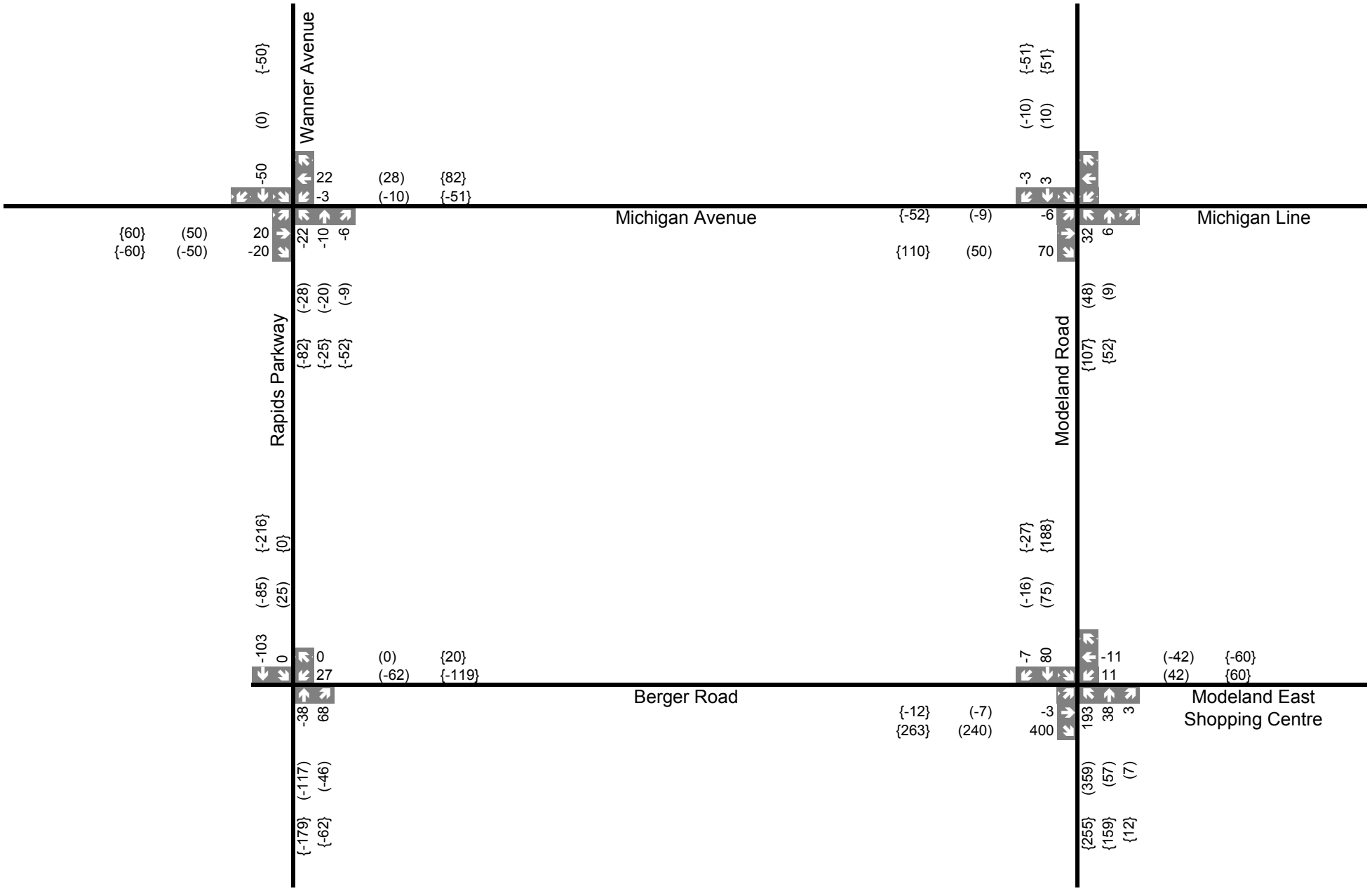
Line / Exmouth Street, and appropriate collector and local roads; trips serving developments along Rapids Parkway were almost entirely directed to access Modeland Road using Berger Road due to the lack of other viable circulation options without the extension. The redirecting of trips for the no extension scenario at each of the study intersections listed below is shown in **Figure 3-2**.

For these scenarios, analysis was focused on the following intersections:

— Berger Road & Modeland Road;
— Rapids Parkway & Berger Road;
— Rapids Parkway / Wanner Avenue & Michigan Avenue; and
— Modeland Road & Michigan Avenue / Michigan Line.

The operation of these intersections was analyzed using Highway Capacity Manual (HCM) methodology and Synchro 10.0 software. The analysis follows the same assumptions as in the original study unless otherwise stated. As part of the analysis of both scenarios, the phasing splits were optimized in Synchro while holding the cycle length constant for the three intersections above that are signalized to adjust for the relative changes in intersection movement volumes caused by traffic serving the developments.

A summary of intersection LOS, delay, and V/C ratios under both scenarios for the AM, PM, and Saturday peak hours is provided in **Table 3-1**, **Table 3-2**, and **Table 3-3** respectively. Level of service (LOS) definitions are provided in **Appendix A** and intersection capacity and queue analysis reports are provided in **Appendix C**.



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xx A.M. Peak Hour Traffic Volumes

(xx) P.M. Peak Hour Traffic Volumes

{xx} Saturday Peak Hour Traffic Volumes

Figure 3-2

Volumes Redirected from Unbuilt Rapids Extension

Table 3-1: 50% Development Build-Out AM Traffic Conditions

Intersection	Movement	Partial Rapids Parkway Extension			No Rapids Parkway Extension		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Modeland Road & Berger Road	**Overall**	**0.53**	**23**	**C**	**0.99**	**63**	**E**
	EBL	0.32	42	D	0.19	35	C
	EBT	0.01	39	D			
	EBR	0.16	40	D	0.95	79	E
	WBL	0.18	43	D	0.23	46	D
	WBT	0.04	27	C	0.02	22	C
	WBR	0.02	26	C	0.02	22	C
	NBL	0.60	15	B	1.08	100	F
	NBT	0.15	10	A	0.19	14	B
	NBR	0.07	9	A	0.07	13	B
	SBL	0.15	19	B	0.25	33	C
	SBTR	0.58	25	C	0.98	65	E
Rapids Parkway & Berger Road	**Overall**		**17**	**C**		**14**	**B**
	WBL	0.51	17	C	0.55	18	C
	WBR	0.13	9	A	0.12	9	A
	NBT	0.49	15	C	0.40	13	B
	NBR	0.19	9	A	0.31	10	B
	SBL	0.19	10	B	0.19	10	B
	SBT	0.72	23	C	0.53	16	C
Rapids Parkway / Wanner Avenue & Michigan Avenue	**Overall**	**0.54**	**22**	**C**	**0.50**	**20**	**C**
	EBL	0.01	13	B	0.01	11	B
	EBTR	0.36	17	B	0.35	15	B
	WBL	0.11	10	B	0.09	9	A
	WBTR	0.14	13	B	0.15	12	B
	NBL	0.84	43	D	0.82	41	D
	NBTR	0.08	20	B	0.06	21	C
	SBL	0.02	19	B	0.02	21	C
	SBTR	0.15	20	C	0.05	21	C
Modeland Road & Michigan Avenue / Michigan Line	**Overall**	**0.69**	**22**	**C**	**0.77**	**26**	**C**
	EBL	0.04	17	B	0.02	16	B
	EBTR	0.83	34	C	0.85	35	C
	WBL	0.35	21	C	0.38	21	C
	WBTR	0.10	18	B	0.09	17	B
	NBL	0.47	19	B	0.69	33	C
	NBTR	0.12	11	B	0.14	13	B
	SBTR	0.60	17	B	0.64	21	C

Table 3-2: 50% Development Build-Out PM Traffic Conditions

Intersection	Movement	Partial Rapids Parkway Extension			No Rapids Parkway Extension		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Modeland Road & Berger Road	**Overall**	**0.57**	**28**	**C**	**1.19**	**79**	**E**
	EBL	0.12	27	C	0.10	27	C
	EBT	0.15	33	C	0.11	32	C
	EBR	0.11	33	C	0.55	37	D
	WBL	0.64	39	D	0.76	47	D
	WBT	0.19	28	C	0.07	27	C
	WBR	0.14	28	C	0.14	27	C
	NBL	0.64	18	B	1.55	285	F
	NBT	0.62	28	C	0.65	29	C
	NBR	0.20	22	C	0.21	23	C
	SBL	0.58	21	C	0.69	31	C
	SBTR	0.58	30	C	0.80	43	D
Rapids Parkway & Berger Road	**Overall**		**12**	**B**		**9**	**A**
	WBL	0.38	13	B	0.23	10	B
	WBR	0.30	10	B	0.27	9	A
	NBT	0.47	14	B	0.23	9	A
	NBR	0.29	10	A	0.20	8	A
	SBL	0.19	10	B	0.22	10	A
	SBT	0.44	13	B	0.25	9	A
Rapids Parkway / Wanner Avenue & Michigan Avenue	**Overall**	**0.42**	**18**	**B**	**0.41**	**16**	**B**
	EBL	0.04	9	A	0.04	8	A
	EBTR	0.28	12	B	0.29	11	B
	WBL	0.08	8	A	0.06	8	A
	WBTR	0.19	11	B	0.21	10	B
	NBL	0.77	39	D	0.72	35	D
	NBTR	0.11	24	C	0.05	24	C
	SBL	0.02	23	C	0.02	23	C
	SBTR	0.04	24	C	0.04	23	C
Modeland Road & Michigan Avenue / Michigan Line	**Overall**	**0.53**	**15**	**B**	**0.59**	**16**	**B**
	EBL	0.19	31	C	0.14	31	C
	EBTR	0.31	32	C	0.34	32	C
	WBL	0.29	33	C	0.29	33	C
	WBTR	0.18	31	C	0.18	31	C
	NBL	0.52	8	A	0.61	10	B
	NBTR	0.28	5	A	0.28	5	A
	SBTR	0.59	18	B	0.61	19	B

Table 3-3: 50% Development Build-Out Saturday Traffic Conditions

Intersection	Movement	Partial Rapids Parkway Extension			No Rapids Parkway Extension		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Modeland Road & Berger Road	**Overall**	**0.55**	**27**	**C**	**0.89**	**45**	**D**
	EBL	0.33	44	D	0.25	44	D
	EBT	0.31	43	D	0.18	43	D
	EBR	0.05	41	D	0.23	44	D
	WBL	0.69	42	D	0.90	63	E
	WBT	0.19	24	C	0.08	25	C
	WBR	0.17	24	C	0.17	26	C
	NBL	0.55	18	B	0.99	69	E
	NBT	0.23	24	C	0.36	26	C
	NBR	0.31	25	C	0.32	26	C
	SBL	0.52	16	B	0.68	29	C
	SBTR	0.49	26	C	0.93	57	E
Rapids Parkway & Berger Road	**Overall**		**13**	**B**		**8**	**A**
	WBL	0.36	13	B	0.08	8	A
	WBR	0.20	9	A	0.18	8	A
	NBT	0.50	14	B	0.14	8	A
	NBR	0.21	9	A	0.09	7	A
	SBL	0.18	10	A	0.15	9	A
	SBT	0.57	16	C	0.15	8	A
Rapids Parkway / Wanner Avenue & Michigan Avenue	**Overall**	**0.45**	**21**	**C**	**0.36**	**15**	**B**
	EBL	0.01	12	B	0.01	7	A
	EBTR	0.29	15	B	0.25	9	A
	WBL	0.14	8	A	0.04	6	A
	WBTR	0.12	11	B	0.16	8	A
	NBL	0.80	41	D	0.70	36	D
	NBTR	0.11	23	C	0.02	25	C
	SBL	0.02	22	C	0.02	25	C
	SBTR	0.12	23	C	0.02	25	C
Modeland Road & Michigan Avenue / Michigan Line	**Overall**	**0.56**	**17**	**B**	**0.60**	**18**	**B**
	EBL	0.41	40	D	0.11	36	D
	EBTR	0.32	38	D	0.46	39	D
	WBL	0.14	37	D	0.14	37	D
	WBTR	0.15	37	D	0.14	36	D
	NBL	0.30	8	A	0.56	11	B
	NBTR	0.17	4	A	0.20	4	A
	SBTR	0.62	16	B	0.64	17	B

The capacity analysis shows that, even at this interim horizon, the scenario without the extension presents extensive delays at the intersection of Berger Road & Modeland Road, particularly for the northbound-left turning movement due to turning at this intersection being the only viable route without the extension to access much of the developments from the south.

Note that these results only focus on the conditions north of Highway 402 and, as indicated in the scenarios identified, there would likely be an impact to the intersections that are to the south to access Modeland Road.

Under forecasted conditions, it is necessary for the Rapids Parkway extension to be constructed prior to 2024. However, continued monitoring of traffic volumes should be done as developments in the area become occupied to improve the trip estimate model.

4 ROUNDABOUT ANALYSIS

In the scenario that the full Rapids Parkway extension is to be built, an analysis was performed to assess future traffic operations if roundabouts are to be implemented at the following intersections:

— Lambton Mall Road and Quinn Drive (currently stop-controlled, assumed to be signalized in the original study)

— Rapids Parkway and Quinn Drive (assumed to be signalized in the original study)

This analysis was done under the assumption that the installation of roundabouts would not affect circulation patterns. As such, volumes used in this analysis are the same as the future total volumes in the original study.

The operation of potential roundabouts at the above intersections was analysed using Sidra Intersection 6.1 software. A summary of intersection LOS, delay, and V/C ratios both with and without the roundabout for the AM, PM and Saturday peak hours is provided in **Table 4-1**, **Table 4-2**, and **Table 4-3** respectively. Roundabout movement results are combined on a per-approach basis. Level of service (LOS) definitions are provided in **Appendix A** and intersection capacity and queue analysis reports are provided in **Appendix D**.

Table 4-1: Future (2027) Total AM Roundabout Comparison

Intersection	Movement	Signalized Intersection (per original study)			Roundabout		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Lambton Mall Road / Home Depot Driveway & Quinn Drive[1]	**Overall**	**0.54**	**19**	**B**	**0.29**	**6**	**A**
	EBT	0.45	17	B	0.22	6	A
	EBR	0.06	14	B			
	WBL	0.84	36	D	0.29	6	A
	WBTR	0.20	15	B			
	NBTL	0.31	13	B	0.28	7	A
	NBR	0.16	11	B			
Rapids Parkway & Quinn Drive	**Overall**	**0.34**	**11**	**B**	**0.61**	**10**	**A**
	WBL	0.45	34	C	0.25	6	A
	WBR	0.09	31	C			
	NBTR	0.16	4	A	0.27	7	A
	SBL	0.33	5	A	0.61	12	B
	SBT	0.25	4	A			

[1]The southbound direction of travel had a negligible number of vehicles and the results are not presented.

Table 4-2: Future (2027) Total PM Roundabout Comparison

Intersection	Movement	Signalized Intersection (per original study)			Roundabout		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Lambton Mall Road / Home Depot Driveway & Quinn Drive[1]	**Overall**	**0.62**	**16**	**B**	**0.47**	**7**	**A**
	EBT	0.24	10	A	0.22	7	A
	EBR	0.08	9	A			
	WBL	0.83	24	C	0.47	8	A
	WBTR	0.28	10	B			
	NBTL	0.31	19	B	0.31	6	A
	NBR	0.19	17	B			
Rapids Parkway & Quinn Drive	**Overall**	**0.27**	**12**	**B**	**0.44**	**8**	**A**
	WBL	0.19	26	C	0.42	9	A
	WBR	0.21	26	C			
	NBTR	0.24	4	A	0.34	8	A
	SBL	0.28	5	A	0.44	8	A
	SBT	0.20	4	A			

[1]Analyzed as a stop-controlled intersection in the "without roundabout" case. The southbound direction of travel had a negligible number of vehicles and the results are not presented.

Table 4-3: Future (2027) Total Saturday Roundabout Comparison

Intersection	Movement	Signalized Intersection (per original study)			Roundabout		
		v/c	Delay (s)	LOS	v/c	Delay (s)	LOS
Lambton Mall Road / Home Depot Driveway & Quinn Drive[1]	**Overall**	**0.63**	**16**	**B**	**0.41**	**8**	**A**
	EBT	0.38	12	B	0.33	8	A
	EBR	0.14	10	B			
	WBL	0.83	27	C	0.40	6	A
	WBTR	0.48	13	B			
	NBTL	0.37	18	B	0.41	8	A
	NBR	0.23	16	B			
Rapids Parkway & Quinn Drive	**Overall**	**0.56**	**16**	**B**	**0.75**	**15**	**B**
	WBL	0.70	40	D	0.57	13	B
	WBR	0.16	30	C			
	NBTR	0.31	6	A	0.51	12	B
	SBL	0.53	10	A	0.75	19	B
	SBT	0.25	6	A			

[1]Analyzed as a stop-controlled intersection in the "without roundabout" case. The southbound direction of travel had a negligible number of vehicles and the results are not presented.

Under 2027 total future conditions, the implantation of a roundabout at the Lambton Mall Road and Quinn Drive, and Rapids Parkway and Quinn Drive intersections results in an overall reduction of delay and an improvement or maintaining of LOS for all time periods.

For Lambton Mall Road and Quinn Drive there is a decrease of overall V/C for each of the time periods. The delay times for all movements are improved for all time periods with the implantation of a roundabout.

As for Rapids Parkway and Quinn Drive there is a minor increase of overall V/C for all time periods but would still be operating well under capacity. The delay of westbound traffic, the most delayed movements for the signalized intersection, is sharply reduced for all time periods, while the northbound and southbound traffic sees minor increases in delays with the implementation of a roundabout.

5 CONCLUSIONS

From our completed analysis, the following has been concluded:

1. Although not strictly necessary from a capacity standpoint, the full extension of The Rapids Parkway to Exmouth Street does present significant benefits for acessing the commercial developments in the area;
2. The conversion of the split signal at the intersection of Exmouth Street and Lambton Mall Road to protected-permitted phasing should be considered regardless of the decision made regarding the Rapids Parkway extension;
3. Based on an assumed 50% level of development, there are operational benefits associated with completing The Rapids Parkway by 2024. This is primarily due to the lack of existing alternatives associated with access to the developments in the area. The operations of local area interestions should be monitored as more residential blocks are occupied; and
4. Both the intersections of Quinn Drive at Rapids Parkway, and Quinn Drive at Lambton Mall Road operate with acceptable level of service and capacity in the event they are converted to roundabouts in either alternative.

APPENDIX

A LEVEL OF SERVICE DEFINITIONS

LEVEL OF SERVICE DEFINITIONS AT SIGNALIZED INTERSECTIONS[1]

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. Specifically, level-of-service (LOS) criteria are stated in terms of the average control delay per vehicle, typically for a 15-min analysis period. The criteria are given in the table below. Delay may be measured in the field or estimated using software such as Highway Capacity Software. Delay is a complex measure and is dependent upon a number of variables, including quality of progression, the cycle length, the green ratio, and the *v/c* ratio for the lane group in question.

Level of Service	Features	Control Delay per vehicle (sec)
A	LOS A describes operations with very low delay, up to 10 sec per vehicle. This level of service occurs when progression is extremely favourable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.	≤ 10
B	LOS B describes operations with delay greater than 10 and up to 20 sec per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.	> 10 and ≤ 20
C	LOS C describes operations with delay greater than 20 and up to 35 sec per vehicle. These higher delays may result from fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.	> 20 and ≤ 35
D	LOS D describes operations with delay greater than 35 and up to 55 sec per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavourable progression, long cycle lengths, of high *v/c* ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.	> 35 and ≤ 55
E	LOS E describes operations with delay greater than 55 and up to 80 sec per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high *v/c* ratios. Individual cycle failures are frequent occurrences.	> 55 and ≤ 80
F	LOS F describes operations with delay in excess of 80 sec per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high *v/c* ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing causes to such delay levels.	> 80

(1) Highway Capacity Manual 2000

LEVEL OF SERVICE DEFINITIONS AT UNSIGNALIZED INTERSECTIONS[1]

The level of service criteria for unsignalized intersections are given in the table below. As used here, total delay is defined as the total elapsed time from when a vehicle stops at the end of the queue until the vehicle departs from the stop line; this time includes the time required for the vehicle to travel from the last-in-queue position to the first-in-queue position. The average total delay for any particular minor movement is a function of the service rate or capacity of the approach and the degree of saturation.

Level of Service	Features	Average Total Delay (sec/veh)
A	Little or no traffic delay occurs. Approaches appear open, turning movements are easily made, and drivers have freedom of operation.	≤ 10
B	Short traffic delays occur. Many drivers begin to feel somewhat restricted in terms of freedom of operation.	> 10 and ≤ 15
C	Average traffic delays occur. Operations are generally stable, but drivers emerging from the minor street may experience difficulty in completing their movement. This may occasionally impact on the stability of flow on the major street.	> 15 and ≤ 25
D	Long traffic delays occur. Motorists emerging from the minor street experience significant restriction and frustration. Drivers on the major street will experience congestion and delay as drivers emerging from the minor street interfere with the major through movements.	> 25 and ≤ 35
E	Very long traffic delays occur. Operations approach the capacity of the intersection.	> 35 and ≤ 50
F	Saturation occurs, with vehicle demand exceeding the available capacity. Very long traffic delays occur.	> 50

(1) Highway Capacity Manual 2000.

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APPENDIX

B

CASES COMPARISON
TAFFIC ANALYSIS
REPORTS

APPENDIX

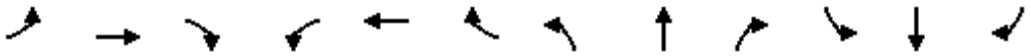
B-1 *FULL EXTENSION ALTERNATIVE*

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	90	133	130	80	252	317
Future Volume (vph)	90	133	130	80	252	317
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.95		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1785	1597	1782		1785	1879
Flt Permitted	0.95	1.00	1.00		0.62	1.00
Satd. Flow (perm)	1785	1597	1782		1158	1879
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	145	141	87	274	345
RTOR Reduction (vph)	0	127	17	0	0	0
Lane Group Flow (vph)	98	18	211	0	274	345
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	9.8	9.8	57.5		57.5	57.5
Effective Green, g (s)	9.8	9.8	57.5		57.5	57.5
Actuated g/C Ratio	0.12	0.12	0.73		0.73	0.73
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	220	197	1292		839	1362
v/s Ratio Prot	c0.05		0.12			0.18
v/s Ratio Perm		0.01			c0.24	
v/c Ratio	0.45	0.09	0.16		0.33	0.25
Uniform Delay, d1	32.2	30.8	3.4		3.9	3.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.4	0.2	0.3		1.0	0.4
Delay (s)	33.7	31.0	3.7		5.0	4.1
Level of Service	C	C	A		A	A
Approach Delay (s)	32.1		3.7			4.5
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	79.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

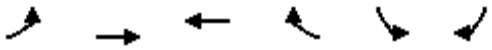
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	280	91	265	119	2	178	2	228	0	1	0
Future Volume (vph)	0	280	91	265	119	2	178	2	228	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0			6.0	6.0		6.0	
Lane Util. Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		1.00	0.99	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	1.00			1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00		1.00	
Satd. Flow (prot)		1879	1560	1784	1860			1790	1548		1879	
Flt Permitted		1.00	1.00	0.51	1.00			0.73	1.00		1.00	
Satd. Flow (perm)		1879	1560	960	1860			1369	1548		1879	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	304	99	288	129	2	193	2	248	0	1	0
RTOR Reduction (vph)	0	0	63	0	1	0	0	0	134	0	0	0
Lane Group Flow (vph)	0	304	36	288	130	0	0	195	114	0	1	0
Confl. Peds. (#/hr)			1	1					1	1		
Heavy Vehicles (%)	0%	0%	1%	0%	0%	50%	0%	0%	1%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	0
Turn Type		NA	Perm	Perm	NA		Perm	NA	Perm		NA	
Protected Phases		4			8			2			6	
Permitted Phases			4	8			2		2	6		
Actuated Green, G (s)		23.8	23.8	23.8	23.8			30.5	30.5		30.5	
Effective Green, g (s)		23.8	23.8	23.8	23.8			30.5	30.5		30.5	
Actuated g/C Ratio		0.36	0.36	0.36	0.36			0.46	0.46		0.46	
Clearance Time (s)		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	
Lane Grp Cap (vph)		674	560	344	667			629	712		864	
v/s Ratio Prot		0.16			0.07						0.00	
v/s Ratio Perm			0.02	c0.30				c0.14	0.07			
v/c Ratio		0.45	0.06	0.84	0.20			0.31	0.16		0.00	
Uniform Delay, d1		16.3	13.9	19.5	14.6			11.3	10.4		9.7	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.5	0.0	16.1	0.1			1.3	0.5		0.0	
Delay (s)		16.7	14.0	35.5	14.8			12.6	10.9		9.7	
Level of Service		B	B	D	B			B	B		A	
Approach Delay (s)		16.1			29.1			11.6			9.7	
Approach LOS		B			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	66.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	349	104	175	254	1	99	1	202	0	0	0
Future Volume (vph)	1	349	104	175	254	1	99	1	202	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	5.0	6.0			6.0	6.0			
Lane Util. Factor	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			1.00	0.85			
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (prot)	1785	1842	1566	1767	1859			1790	1597			
Flt Permitted	0.59	1.00	1.00	0.42	1.00			0.73	1.00			
Satd. Flow (perm)	1107	1842	1566	774	1859			1368	1597			
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)	1	379	113	190	276	1	108	1	220	0	0	0
RTOR Reduction (vph)	0	0	57	0	0	0	0	0	171	0	0	0
Lane Group Flow (vph)	1	379	56	190	277	0	0	109	49	0	0	0
Heavy Vehicles (%)	0%	2%	2%	1%	1%	0%	0%	2%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm			
Protected Phases		2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		
Actuated Green, G (s)	44.0	44.0	44.0	57.0	57.0			20.0	20.0			
Effective Green, g (s)	44.0	44.0	44.0	57.0	57.0			20.0	20.0			
Actuated g/C Ratio	0.49	0.49	0.49	0.64	0.64			0.22	0.22			
Clearance Time (s)	6.0	6.0	6.0	5.0	6.0			6.0	6.0			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	547	910	774	584	1190			307	358			
v/s Ratio Prot		c0.21		c0.03	0.15							
v/s Ratio Perm	0.00		0.04	0.18				c0.08	0.03			
v/c Ratio	0.00	0.42	0.07	0.33	0.23			0.36	0.14			
Uniform Delay, d1	11.4	14.3	11.8	7.3	6.8			29.1	27.6			
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00			
Incremental Delay, d2	0.0	1.4	0.2	0.3	0.1			0.7	0.2			
Delay (s)	11.4	15.7	12.0	7.6	6.9			29.8	27.8			
Level of Service	B	B	B	A	A			C	C			
Approach Delay (s)		14.9			7.2			28.4			0.0	
Approach LOS		B			A			C			A	

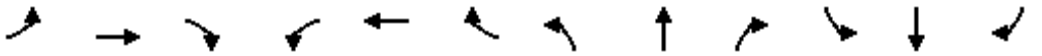
Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	89.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	130	642	671	80	125	282
Future Volume (vph)	130	642	671	80	125	282
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		5.0	5.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1750	3500	3444		1750	1566
Flt Permitted	0.25	1.00	1.00		0.95	1.00
Satd. Flow (perm)	453	3500	3444		1750	1566
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	698	729	87	136	307
RTOR Reduction (vph)	0	0	14	0	0	129
Lane Group Flow (vph)	141	698	802	0	136	178
Turn Type	Perm	NA	NA		Prot	Perm
Protected Phases		4	8		6	
Permitted Phases	4					6
Actuated Green, G (s)	24.6	24.6	24.6		30.5	30.5
Effective Green, g (s)	24.6	24.6	24.6		30.5	30.5
Actuated g/C Ratio	0.37	0.37	0.37		0.46	0.46
Clearance Time (s)	6.0	6.0	6.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	168	1302	1281		807	722
v/s Ratio Prot		0.20	0.23		0.08	
v/s Ratio Perm	c0.31					c0.11
v/c Ratio	0.84	0.54	0.63		0.17	0.25
Uniform Delay, d1	18.9	16.3	17.0		10.4	10.8
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	29.1	0.4	1.0		0.5	0.8
Delay (s)	48.0	16.7	18.0		10.8	11.6
Level of Service	D	B	B		B	B
Approach Delay (s)		22.0	18.0		11.4	
Approach LOS		C	B		B	

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	66.1	Sum of lost time (s)	11.0
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

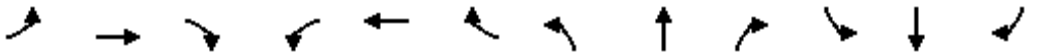
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	139	367	240	130	370	39	181	296	107	81	222	152
Future Volume (vph)	139	367	240	130	370	39	181	296	107	81	222	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.94		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1784	3286		1784	3483		1696	1763	1549	1785	1860	1560
Flt Permitted	0.30	1.00		0.19	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	562	3286		361	3483		1696	1763	1549	1785	1860	1560
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)	151	399	261	141	402	42	197	322	116	88	241	165
RTOR Reduction (vph)	0	101	0	0	7	0	0	0	89	0	0	120
Lane Group Flow (vph)	151	559	0	141	437	0	177	342	27	88	241	45
Confl. Peds. (#/hr)	2		5	5		2	1		5	5		1
Heavy Vehicles (%)	0%	1%	2%	0%	1%	0%	0%	1%	1%	0%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	32.6	22.3		29.6	20.8		25.9	25.9	25.9	30.0	30.0	30.0
Effective Green, g (s)	32.6	22.3		29.6	20.8		25.9	25.9	25.9	30.0	30.0	30.0
Actuated g/C Ratio	0.30	0.20		0.27	0.19		0.24	0.24	0.24	0.27	0.27	0.27
Clearance Time (s)	5.0	6.0		5.0	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	3.0
Lane Grp Cap (vph)	280	666		210	658		399	415	364	486	507	425
v/s Ratio Prot	0.05	c0.17		c0.05	0.13		0.10	c0.19		0.05	c0.13	
v/s Ratio Perm	0.11			0.13					0.02			0.03
v/c Ratio	0.54	0.84		0.67	0.66		0.44	0.82	0.08	0.18	0.48	0.11
Uniform Delay, d1	30.2	42.1		32.9	41.4		35.9	39.9	32.7	30.6	33.4	30.0
Progression Factor	1.00	1.00		1.73	0.43		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	2.0	9.1		7.7	2.4		0.8	12.5	0.1	0.8	3.2	0.5
Delay (s)	32.2	51.2		64.5	20.4		36.7	52.4	32.8	31.4	36.6	30.5
Level of Service	C	D		E	C		D	D	C	C	D	C
Approach Delay (s)		47.7			31.0			44.4			33.6	
Approach LOS		D			C			D			C	

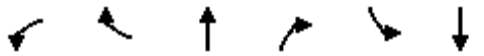
Intersection Summary			
HCM 2000 Control Delay	40.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



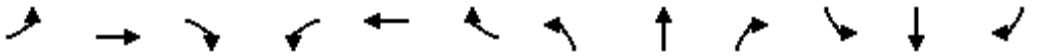
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	84	348	25	66	445	189	23	42	33	123	98	65
Future Volume (vph)	84	348	25	66	445	189	23	42	33	123	98	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0	6.0		6.0			6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.97	1.00
Satd. Flow (prot)	1785	3469		1750	3570	1581		1773			1818	1551
Flt Permitted	0.25	1.00		0.51	1.00	1.00		0.91			0.78	1.00
Satd. Flow (perm)	466	3469		947	3570	1581		1626			1449	1551
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)	91	378	27	72	484	205	25	46	36	134	107	71
RTOR Reduction (vph)	0	6	0	0	0	164	0	11	0	0	0	30
Lane Group Flow (vph)	91	399	0	72	484	41	0	96	0	0	241	41
Heavy Vehicles (%)	0%	2%	0%	2%	0%	1%	0%	0%	0%	1%	0%	3%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	34.9	34.9		22.1	22.1	22.1		63.1			63.1	63.1
Effective Green, g (s)	34.9	34.9		22.1	22.1	22.1		63.1			63.1	63.1
Actuated g/C Ratio	0.32	0.32		0.20	0.20	0.20		0.57			0.57	0.57
Clearance Time (s)	4.0	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)	253	1100		190	717	317		932			831	889
v/s Ratio Prot	0.03	c0.11			c0.14							
v/s Ratio Perm	0.09			0.08		0.03		0.06			c0.17	0.03
v/c Ratio	0.36	0.36		0.38	0.68	0.13		0.10			0.29	0.05
Uniform Delay, d1	27.8	29.0		38.0	40.6	36.1		10.6			12.0	10.3
Progression Factor	1.38	1.26		1.12	1.10	3.13		1.00			1.00	1.00
Incremental Delay, d2	0.7	0.2		1.2	2.5	0.2		0.2			0.2	0.1
Delay (s)	38.9	36.6		43.8	47.1	113.2		10.9			12.2	10.4
Level of Service	D	D		D	D	F		B			B	B
Approach Delay (s)		37.0			64.6			10.9			11.8	
Approach LOS		D			E			B			B	

Intersection Summary			
HCM 2000 Control Delay	43.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	40	310	200	80	193	239
Future Volume (vph)	40	310	200	80	193	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1785	1597	1806		1785	1879
Flt Permitted	0.95	1.00	1.00		0.57	1.00
Satd. Flow (perm)	1785	1597	1806		1080	1879
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	337	217	87	210	260
RTOR Reduction (vph)	0	294	10	0	0	0
Lane Group Flow (vph)	43	43	294	0	210	260
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	8.5	8.5	45.4		45.4	45.4
Effective Green, g (s)	8.5	8.5	45.4		45.4	45.4
Actuated g/C Ratio	0.13	0.13	0.69		0.69	0.69
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	230	205	1244		744	1294
v/s Ratio Prot	0.02		0.16			0.14
v/s Ratio Perm		c0.03			c0.19	
v/c Ratio	0.19	0.21	0.24		0.28	0.20
Uniform Delay, d1	25.6	25.7	3.8		4.0	3.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.4	0.5	0.4		0.9	0.3
Delay (s)	26.0	26.2	4.3		4.9	4.1
Level of Service	C	C	A		A	A
Approach Delay (s)	26.2		4.3			4.4
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	65.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

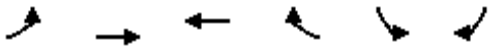


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	201	120	436	234	1	133	0	273	0	0	0
Future Volume (vph)	0	201	120	436	234	1	133	0	273	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0			6.0	6.0			
Lane Util. Factor		1.00	1.00	1.00	1.00			1.00	1.00			
Frpb, ped/bikes		1.00	0.99	1.00	1.00			1.00	0.99			
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00			
Frt		1.00	0.85	1.00	1.00			1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (prot)		1879	1574	1782	1878			1785	1563			
Flt Permitted		1.00	1.00	0.62	1.00			0.76	1.00			
Satd. Flow (perm)		1879	1574	1166	1878			1423	1563			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	218	130	474	254	1	145	0	297	0	0	0
RTOR Reduction (vph)	0	0	66	0	0	0	0	0	200	0	0	0
Lane Group Flow (vph)	0	218	64	474	255	0	0	145	97	0	0	0
Confl. Peds. (#/hr)	3		2	2		3			1	1		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	0
Turn Type		NA	Perm	Perm	NA		Perm	NA	Perm			
Protected Phases		4			8			2			6	
Permitted Phases			4	8			2		2	6		
Actuated Green, G (s)		32.7	32.7	32.7	32.7			21.8	21.8			
Effective Green, g (s)		32.7	32.7	32.7	32.7			21.8	21.8			
Actuated g/C Ratio		0.49	0.49	0.49	0.49			0.33	0.33			
Clearance Time (s)		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			
Lane Grp Cap (vph)		923	773	573	923			466	512			
v/s Ratio Prot		0.12			0.14							
v/s Ratio Perm			0.04	c0.41				c0.10	0.06			
v/c Ratio		0.24	0.08	0.83	0.28			0.31	0.19			
Uniform Delay, d1		9.7	9.0	14.5	9.9			16.7	16.0			
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00			
Incremental Delay, d2		0.1	0.0	9.5	0.2			1.7	0.8			
Delay (s)		9.9	9.0	24.0	10.1			18.5	16.8			
Level of Service		A	A	C	B			B	B			
Approach Delay (s)		9.5			19.2			17.4			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	66.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	368	86	291	446	1	178	1	219	0	0	0
Future Volume (vph)	0	368	86	291	446	1	178	1	219	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	5.0	6.0			6.0	6.0			
Lane Util. Factor		1.00	1.00	1.00	1.00			1.00	1.00			
Frt		1.00	0.85	1.00	1.00			1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (prot)		1860	1581	1767	1878			1772	1581			
Flt Permitted		1.00	1.00	0.39	1.00			0.73	1.00			
Satd. Flow (perm)		1860	1581	733	1878			1353	1581			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	400	93	316	485	1	193	1	238	0	0	0
RTOR Reduction (vph)	0	0	48	0	0	0	0	0	181	0	0	0
Lane Group Flow (vph)	0	400	45	316	486	0	0	194	57	0	0	0
Heavy Vehicles (%)	0%	1%	1%	1%	0%	0%	1%	0%	1%	0%	0%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm			
Protected Phases		2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		
Actuated Green, G (s)		44.1	44.1	57.1	57.1			21.8	21.8			
Effective Green, g (s)		44.1	44.1	57.1	57.1			21.8	21.8			
Actuated g/C Ratio		0.49	0.49	0.63	0.63			0.24	0.24			
Clearance Time (s)		6.0	6.0	5.0	6.0			6.0	6.0			
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)		902	767	551	1179			324	379			
v/s Ratio Prot		0.22		c0.05	0.26							
v/s Ratio Perm			0.03	c0.31				c0.14	0.04			
v/c Ratio		0.44	0.06	0.57	0.41			0.60	0.15			
Uniform Delay, d1		15.3	12.4	8.9	8.5			30.7	27.2			
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00			
Incremental Delay, d2		1.6	0.1	1.4	0.2			3.0	0.2			
Delay (s)		16.9	12.5	10.3	8.7			33.6	27.4			
Level of Service		B	B	B	A			C	C			
Approach Delay (s)		16.1			9.4			30.2			0.0	
Approach LOS		B			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	16.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	90.9	Sum of lost time (s)	17.0
Intersection Capacity Utilization	71.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	207	853	999	73	107	172
Future Volume (vph)	207	853	999	73	107	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0	6.0		5.0	5.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.99		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1750	3500	3464		1750	1566
Flt Permitted	0.09	1.00	1.00		0.95	1.00
Satd. Flow (perm)	173	3500	3464		1750	1566
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	225	927	1086	79	116	187
RTOR Reduction (vph)	0	0	5	0	0	143
Lane Group Flow (vph)	225	927	1160	0	116	44
Turn Type	pm+pt	NA	NA		Perm	Perm
Protected Phases	7	4	8			
Permitted Phases	4				6	6
Actuated Green, G (s)	57.9	57.9	37.6		21.5	21.5
Effective Green, g (s)	57.9	57.9	37.6		21.5	21.5
Actuated g/C Ratio	0.64	0.64	0.42		0.24	0.24
Clearance Time (s)	5.0	6.0	6.0		5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	377	2241	1440		416	372
v/s Ratio Prot	c0.10	0.26	c0.33			
v/s Ratio Perm	0.28				c0.07	0.03
v/c Ratio	0.60	0.41	0.81		0.28	0.12
Uniform Delay, d1	17.9	7.9	23.2		28.1	27.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	2.5	0.1	3.4		1.7	0.7
Delay (s)	20.5	8.1	26.6		29.8	27.7
Level of Service	C	A	C		C	C
Approach Delay (s)		10.5	26.6		28.5	
Approach LOS		B	C		C	

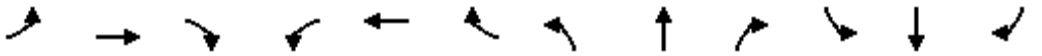
Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	168	456	296	221	533	54	289	257	174	161	295	285
Future Volume (vph)	168	456	296	221	533	54	289	257	174	161	295	285
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.99	1.00	1.00
Frt	1.00	0.94		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1783	3324		1750	3481		1696	1760	1555	1768	1879	1575
Flt Permitted	0.27	1.00		0.13	1.00		0.95	1.00	1.00	0.56	1.00	1.00
Satd. Flow (perm)	501	3324		247	3481		1696	1760	1555	1048	1879	1575
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)	183	496	322	240	579	59	314	279	189	175	321	310
RTOR Reduction (vph)	0	98	0	0	7	0	0	0	111	0	0	199
Lane Group Flow (vph)	183	720	0	240	631	0	283	310	78	175	321	111
Confl. Peds. (#/hr)	7		3	3		7	1		9	9		1
Heavy Vehicles (%)	0%	0%	1%	2%	1%	0%	0%	1%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Perm	NA	Perm
Protected Phases	7	4		3	8		2	2			6	
Permitted Phases	4			8					2	6		6
Actuated Green, G (s)	36.0	26.7		42.2	29.8		22.3	22.3	22.3	25.6	25.6	25.6
Effective Green, g (s)	36.0	26.7		42.2	29.8		22.3	22.3	22.3	25.6	25.6	25.6
Actuated g/C Ratio	0.33	0.24		0.38	0.27		0.20	0.20	0.20	0.23	0.23	0.23
Clearance Time (s)	5.0	6.0		5.0	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	3.0
Lane Grp Cap (vph)	272	806		264	943		343	356	315	243	437	366
v/s Ratio Prot	0.06	0.22		c0.10	0.18		0.17	c0.18			c0.17	
v/s Ratio Perm	0.16			c0.25					0.05	0.17		0.07
v/c Ratio	0.67	0.89		0.91	0.67		0.83	0.87	0.25	0.72	0.73	0.30
Uniform Delay, d1	28.3	40.3		27.3	35.7		42.0	42.5	36.8	38.9	39.1	34.8
Progression Factor	1.00	1.00		2.22	0.43		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.4	12.3		29.3	1.6		14.8	20.1	0.4	16.8	10.5	2.1
Delay (s)	34.7	52.6		89.9	17.1		56.8	62.5	37.2	55.7	49.5	36.9
Level of Service	C	D		F	B		E	E	D	E	D	D
Approach Delay (s)		49.3			37.0			54.3			46.0	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	46.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	85.6%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	118	613	24	58	622	185	36	148	59	229	49	104
Future Volume (vph)	118	613	24	58	622	185	36	148	59	229	49	104
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	6.0	6.0		6.0			6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97		1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.96	1.00
Satd. Flow (prot)	1785	3513		1783	3570	1539		1782			1788	1522
Flt Permitted	0.18	1.00		0.39	1.00	1.00		0.92			0.58	1.00
Satd. Flow (perm)	329	3513		729	3570	1539		1644			1084	1522
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)	128	666	26	63	676	201	39	161	64	249	53	113
RTOR Reduction (vph)	0	3	0	0	0	149	0	8	0	0	0	57
Lane Group Flow (vph)	128	689	0	63	676	52	0	256	0	0	302	56
Confl. Peds. (#/hr)	3		1	1		3	4		1	1		4
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	1%	1%	1%	0%	3%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	43.7	43.7		28.5	28.5	28.5		54.3			54.3	54.3
Effective Green, g (s)	43.7	43.7		28.5	28.5	28.5		54.3			54.3	54.3
Actuated g/C Ratio	0.40	0.40		0.26	0.26	0.26		0.49			0.49	0.49
Clearance Time (s)	4.0	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)	278	1395		188	924	398		811			535	751
v/s Ratio Prot	0.05	c0.20			c0.19							
v/s Ratio Perm	0.14			0.09		0.03		0.16			c0.28	0.04
v/c Ratio	0.46	0.49		0.34	0.73	0.13		0.32			0.56	0.07
Uniform Delay, d1	23.3	24.9		33.1	37.3	31.3		16.7			19.5	14.6
Progression Factor	1.34	1.23		1.27	1.24	4.03		1.00			1.00	1.00
Incremental Delay, d2	0.8	0.2		1.0	2.9	0.1		1.0			1.4	0.2
Delay (s)	32.0	30.7		43.1	48.9	126.1		17.7			20.9	14.8
Level of Service	C	C		D	D	F		B			C	B
Approach Delay (s)		30.9			65.0			17.7			19.3	
Approach LOS		C			E			B			B	

Intersection Summary			
HCM 2000 Control Delay	40.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	81.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

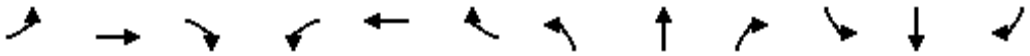
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	200	231	281	90	318	299
Future Volume (vph)	200	231	281	90	318	299
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1785	1597	1817		1785	1879
Flt Permitted	0.95	1.00	1.00		0.51	1.00
Satd. Flow (perm)	1785	1597	1817		957	1879
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	251	305	98	346	325
RTOR Reduction (vph)	0	207	12	0	0	0
Lane Group Flow (vph)	217	44	391	0	346	325
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	15.0	15.0	59.1		59.1	59.1
Effective Green, g (s)	15.0	15.0	59.1		59.1	59.1
Actuated g/C Ratio	0.17	0.17	0.69		0.69	0.69
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	310	278	1247		656	1289
v/s Ratio Prot	c0.12		0.22			0.17
v/s Ratio Perm		0.03			c0.36	
v/c Ratio	0.70	0.16	0.31		0.53	0.25
Uniform Delay, d1	33.4	30.2	5.4		6.6	5.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.8	0.3	0.7		3.0	0.5
Delay (s)	40.2	30.4	6.1		9.7	5.6
Level of Service	D	C	A		A	A
Approach Delay (s)	35.0		6.1			7.7
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	86.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	306	208	347	385	0	170	0	330	0	0	0
Future Volume (vph)	0	306	208	347	385	0	170	0	330	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0			6.0	6.0			
Lane Util. Factor		1.00	1.00	1.00	1.00			1.00	1.00			
Frt		1.00	0.85	1.00	1.00			1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (prot)		1879	1597	1785	1879			1785	1569			
Flt Permitted		1.00	1.00	0.52	1.00			0.76	1.00			
Satd. Flow (perm)		1879	1597	980	1879			1423	1569			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	333	226	377	418	0	185	0	359	0	0	0
RTOR Reduction (vph)	0	0	121	0	0	0	0	0	231	0	0	0
Lane Group Flow (vph)	0	333	105	377	418	0	0	185	128	0	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	0
Turn Type		NA	Perm	Perm	NA		Perm	NA	Perm			
Protected Phases		4			8			2			6	
Permitted Phases			4	8			2		2	6		
Actuated Green, G (s)		31.2	31.2	31.2	31.2			23.8	23.8			
Effective Green, g (s)		31.2	31.2	31.2	31.2			23.8	23.8			
Actuated g/C Ratio		0.47	0.47	0.47	0.47			0.36	0.36			
Clearance Time (s)		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			
Lane Grp Cap (vph)		874	743	456	874			505	557			
v/s Ratio Prot		0.18			0.22							
v/s Ratio Perm			0.07	c0.38				c0.13	0.08			
v/c Ratio		0.38	0.14	0.83	0.48			0.37	0.23			
Uniform Delay, d1		11.6	10.2	15.6	12.3			16.0	15.2			
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00			
Incremental Delay, d2		0.3	0.1	11.7	0.4			2.0	1.0			
Delay (s)		11.9	10.3	27.2	12.7			18.1	16.1			
Level of Service		B	B	C	B			B	B			
Approach Delay (s)		11.3			19.6			16.8			0.0	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	67.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		

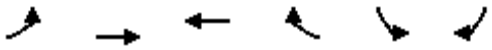
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	482	105	294	517	1	147	0	372	0	0	1
Future Volume (vph)	1	482	105	294	517	1	147	0	372	0	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	5.0	6.0			6.0	6.0		6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00		0.98	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00			1.00	0.85		0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		1.00	
Satd. Flow (prot)	1778	1860	1597	1767	1878			1777	1597		1586	
Flt Permitted	0.45	1.00	1.00	0.30	1.00			0.76	1.00		1.00	
Satd. Flow (perm)	848	1860	1597	556	1878			1416	1597		1586	
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)	1	524	114	320	562	1	160	0	404	0	0	1
RTOR Reduction (vph)	0	0	58	0	0	0	0	0	279	0	1	0
Lane Group Flow (vph)	1	524	56	320	563	0	0	160	125	0	0	0
Confl. Peds. (#/hr)	4					4	2					2
Heavy Vehicles (%)	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm		NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		
Actuated Green, G (s)	44.0	44.0	44.0	57.0	57.0			20.8	20.8		20.8	
Effective Green, g (s)	44.0	44.0	44.0	57.0	57.0			20.8	20.8		20.8	
Actuated g/C Ratio	0.49	0.49	0.49	0.63	0.63			0.23	0.23		0.23	
Clearance Time (s)	6.0	6.0	6.0	5.0	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)	415	911	782	460	1192			327	369		367	
v/s Ratio Prot		0.28		c0.06	0.30						0.00	
v/s Ratio Perm	0.00		0.03	c0.38				c0.11	0.08			
v/c Ratio	0.00	0.58	0.07	0.70	0.47			0.49	0.34		0.00	
Uniform Delay, d1	11.7	16.3	12.1	10.1	8.6			29.9	28.8		26.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.0	2.6	0.2	4.5	0.3			1.2	0.5		0.0	
Delay (s)	11.7	18.9	12.3	14.6	8.9			31.1	29.3		26.5	
Level of Service	B	B	B	B	A			C	C		C	
Approach Delay (s)		17.7			10.9			29.8			26.5	
Approach LOS		B			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	18.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	89.8	Sum of lost time (s)	17.0
Intersection Capacity Utilization	75.6%	ICU Level of Service	D
Analysis Period (min)	15		

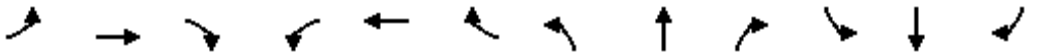
c Critical Lane Group



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	233	1001	952	139	98	402
Future Volume (vph)	233	1001	952	139	98	402
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	0.95	0.95		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1750	3500	3433		1750	1566
Flt Permitted	0.09	1.00	1.00		0.95	1.00
Satd. Flow (perm)	164	3500	3433		1750	1566
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	253	1088	1035	151	107	437
RTOR Reduction (vph)	0	0	11	0	0	274
Lane Group Flow (vph)	253	1088	1175	0	107	163
Turn Type	pm+pt	NA	NA		Prot	Perm
Protected Phases	7	4	8		6	
Permitted Phases	4					6
Actuated Green, G (s)	61.6	61.6	39.9		23.4	23.4
Effective Green, g (s)	61.6	61.6	39.9		23.4	23.4
Actuated g/C Ratio	0.64	0.64	0.41		0.24	0.24
Clearance Time (s)	5.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	377	2222	1412		422	377
v/s Ratio Prot	c0.12	0.31	c0.34		0.06	
v/s Ratio Perm	0.31					c0.10
v/c Ratio	0.67	0.49	0.83		0.25	0.43
Uniform Delay, d1	22.6	9.4	25.6		29.7	31.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	4.6	0.2	4.3		1.4	3.6
Delay (s)	27.2	9.5	29.9		31.2	34.8
Level of Service	C	A	C		C	C
Approach Delay (s)		12.9	29.9		34.1	
Approach LOS		B	C		C	

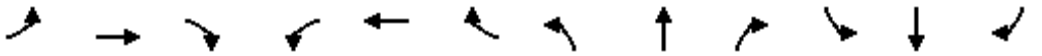
Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	97.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	66.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	222	555	249	192	643	75	324	309	203	215	335	165
Future Volume (vph)	222	555	249	192	643	75	324	309	203	215	335	165
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1784	3369		1785	3462		1696	1761	1553	1785	1879	1558
Flt Permitted	0.14	1.00		0.15	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	268	3369		278	3462		1696	1761	1553	1785	1879	1558
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)	241	603	271	209	699	82	352	336	221	234	364	179
RTOR Reduction (vph)	0	47	0	0	8	0	0	0	109	0	0	140
Lane Group Flow (vph)	241	827	0	209	773	0	317	371	112	234	364	39
Confl. Peds. (#/hr)	15		7	7		15	7		9	9		7
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	0%	0%	1%	0%	1%	2%	0%	1%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	40.0	28.0		38.0	27.0		24.0	24.0	24.0	24.0	24.0	24.0
Effective Green, g (s)	40.0	28.0		38.0	27.0		24.0	24.0	24.0	24.0	24.0	24.0
Actuated g/C Ratio	0.36	0.25		0.35	0.25		0.22	0.22	0.22	0.22	0.22	0.22
Clearance Time (s)	5.0	6.0		5.0	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	3.0
Lane Grp Cap (vph)	262	857		246	849		370	384	338	389	409	339
v/s Ratio Prot	c0.10	c0.25		0.08	0.22		0.19	c0.21		0.13	c0.19	
v/s Ratio Perm	0.23			0.21					0.07			0.03
v/c Ratio	0.92	0.97		0.85	0.91		0.86	0.97	0.33	0.60	0.89	0.12
Uniform Delay, d1	28.1	40.5		29.1	40.3		41.3	42.6	36.2	38.7	41.7	34.5
Progression Factor	1.00	1.00		2.01	0.57		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	34.5	22.4		19.2	11.5		17.4	36.7	0.6	6.7	24.0	0.7
Delay (s)	62.6	62.9		77.6	34.5		58.8	79.3	36.8	45.4	65.7	35.2
Level of Service	E	E		E	C		E	E	D	D	E	D
Approach Delay (s)		62.8			43.6			61.8			52.6	
Approach LOS		E			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	55.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	88.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



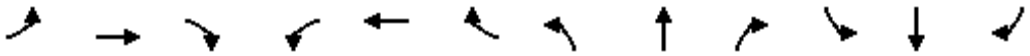
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	147	677	27	94	707	254	57	130	72	222	118	148
Future Volume (vph)	147	677	27	94	707	254	57	130	72	222	118	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		6.0	6.0	6.0		6.0			6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		0.96			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.97	1.00
Satd. Flow (prot)	1785	3546		1782	3535	1558		1783			1819	1557
Flt Permitted	0.15	1.00		0.36	1.00	1.00		0.83			0.62	1.00
Satd. Flow (perm)	277	3546		678	3535	1558		1491			1166	1557
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)	160	736	29	102	768	276	62	141	78	241	128	161
RTOR Reduction (vph)	0	3	0	0	0	198	0	10	0	0	0	87
Lane Group Flow (vph)	160	762	0	102	768	78	0	271	0	0	369	74
Confl. Peds. (#/hr)	2		2	2		2	2					2
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	1%	0%	0%	1%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	47.1	47.1		31.2	31.2	31.2		50.9			50.9	50.9
Effective Green, g (s)	47.1	47.1		31.2	31.2	31.2		50.9			50.9	50.9
Actuated g/C Ratio	0.43	0.43		0.28	0.28	0.28		0.46			0.46	0.46
Clearance Time (s)	4.0	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)	281	1518		192	1002	441		689			539	720
v/s Ratio Prot	c0.06	0.21			c0.22							
v/s Ratio Perm	0.18			0.15		0.05		0.18			c0.32	0.05
v/c Ratio	0.57	0.50		0.53	0.77	0.18		0.39			0.68	0.10
Uniform Delay, d1	22.3	22.9		33.2	36.1	29.7		19.4			23.2	16.7
Progression Factor	1.47	1.33		1.18	1.18	4.64		1.00			1.00	1.00
Incremental Delay, d2	1.6	0.2		2.4	3.1	0.2		1.7			3.6	0.3
Delay (s)	34.4	30.6		41.5	45.5	138.1		21.1			26.8	17.0
Level of Service	C	C		D	D	F		C			C	B
Approach Delay (s)		31.3			67.5			21.1			23.8	
Approach LOS		C			E			C			C	

Intersection Summary			
HCM 2000 Control Delay	43.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX

B-2 *REDUCED EXTENSION ALTERNATIVE*

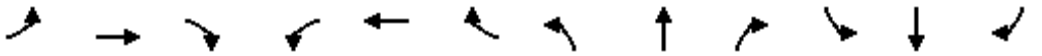


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	262	345	292	101	2	235	2	252	0	1	0
Future Volume (vph)	0	262	345	292	101	2	235	2	252	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0			6.0	6.0		6.0	
Lane Util. Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		1.00	0.99	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	1.00			1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00		1.00	
Satd. Flow (prot)		1879	1560	1783	1855			1790	1548		1879	
Flt Permitted		1.00	1.00	0.56	1.00			0.73	1.00		1.00	
Satd. Flow (perm)		1879	1560	1060	1855			1368	1548		1879	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	262	345	292	101	2	235	2	252	0	1	0
RTOR Reduction (vph)	0	0	226	0	1	0	0	0	134	0	0	0
Lane Group Flow (vph)	0	262	119	292	102	0	0	237	118	0	1	0
Confl. Peds. (#/hr)			1	1					1	1		
Heavy Vehicles (%)	0%	0%	1%	0%	0%	50%	0%	0%	1%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	0
Turn Type		NA	Perm	Perm	NA		Perm	NA	Perm		NA	
Protected Phases		4			8			2			6	
Permitted Phases			4	8			2		2	6		
Actuated Green, G (s)		22.3	22.3	22.3	22.3			30.4	30.4		30.4	
Effective Green, g (s)		22.3	22.3	22.3	22.3			30.4	30.4		30.4	
Actuated g/C Ratio		0.34	0.34	0.34	0.34			0.47	0.47		0.47	
Clearance Time (s)		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	
Lane Grp Cap (vph)		647	537	365	639			642	727		882	
v/s Ratio Prot		0.14			0.05						0.00	
v/s Ratio Perm			0.08	c0.28				c0.17	0.08			
v/c Ratio		0.40	0.22	0.80	0.16			0.37	0.16		0.00	
Uniform Delay, d1		16.1	15.0	19.2	14.7			11.0	9.8		9.1	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.4	0.2	12.9	0.1			1.6	0.5		0.0	
Delay (s)		16.6	15.3	32.1	14.8			12.6	10.3		9.1	
Level of Service		B	B	C	B			B	B		A	
Approach Delay (s)		15.8			27.6			11.4			9.1	
Approach LOS		B			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	17.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	64.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.8%	ICU Level of Service	C
Analysis Period (min)	60		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	293	166	238	191	1	171	1	258	0	0	0
Future Volume (vph)	1	293	166	238	191	1	171	1	258	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	5.0	6.0			6.0	6.0			
Lane Util. Factor	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			1.00	0.85			
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (prot)	1785	1842	1566	1767	1859			1790	1597			
Flt Permitted	0.64	1.00	1.00	0.46	1.00			0.73	1.00			
Satd. Flow (perm)	1196	1842	1566	858	1859			1367	1597			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1	293	166	238	191	1	171	1	258	0	0	0
RTOR Reduction (vph)	0	0	95	0	0	0	0	0	194	0	0	0
Lane Group Flow (vph)	1	293	71	238	192	0	0	172	64	0	0	0
Heavy Vehicles (%)	0%	2%	2%	1%	1%	0%	0%	2%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm			
Protected Phases		2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		
Actuated Green, G (s)	36.1	36.1	36.1	51.8	51.8			21.0	21.0			
Effective Green, g (s)	36.1	36.1	36.1	51.8	51.8			21.0	21.0			
Actuated g/C Ratio	0.43	0.43	0.43	0.61	0.61			0.25	0.25			
Clearance Time (s)	6.0	6.0	6.0	5.0	6.0			6.0	6.0			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)	509	784	666	638	1135			338	395			
v/s Ratio Prot		0.16		c0.05	0.10							
v/s Ratio Perm	0.00		0.05	c0.18				c0.13	0.04			
v/c Ratio	0.00	0.37	0.11	0.37	0.17			0.51	0.16			
Uniform Delay, d1	14.0	16.6	14.6	8.0	7.2			27.5	25.0			
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00			
Incremental Delay, d2	0.0	1.4	0.3	0.4	0.1			1.2	0.2			
Delay (s)	14.0	18.0	15.0	8.3	7.2			28.7	25.2			
Level of Service	B	B	B	A	A			C	C			
Approach Delay (s)		16.9			7.8			26.6			0.0	
Approach LOS		B			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	84.8	Sum of lost time (s)	17.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	60		
c Critical Lane Group			



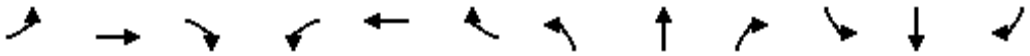
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	212	297	239	129	352	47	181	296	107	143	222	371
Future Volume (vph)	212	297	239	129	352	47	181	296	107	143	222	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1784	3253		1783	3470		1696	1763	1548	1785	1860	1559
Flt Permitted	0.23	1.00		0.30	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	439	3253		558	3470		1696	1763	1548	1785	1860	1559
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	212	297	239	129	352	47	181	296	107	143	222	371
RTOR Reduction (vph)	0	126	0	0	9	0	0	0	83	0	0	256
Lane Group Flow (vph)	212	410	0	129	390	0	163	314	24	143	222	115
Confl. Peds. (#/hr)	2		5	5		2	1		5	5		1
Heavy Vehicles (%)	0%	1%	2%	0%	1%	0%	0%	1%	1%	0%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	38.2	23.6		27.4	17.8		26.7	26.7	26.7	37.1	37.1	37.1
Effective Green, g (s)	38.2	23.6		27.4	17.8		26.7	26.7	26.7	37.1	37.1	37.1
Actuated g/C Ratio	0.32	0.20		0.23	0.15		0.22	0.22	0.22	0.31	0.31	0.31
Clearance Time (s)	5.0	6.0		5.0	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	3.0
Lane Grp Cap (vph)	312	639		225	514		377	392	344	551	575	481
v/s Ratio Prot	c0.09	0.13		0.05	0.11		0.10	c0.18		0.08	c0.12	
v/s Ratio Perm	c0.13			0.08					0.02			0.07
v/c Ratio	0.68	0.64		0.57	0.76		0.43	0.80	0.07	0.26	0.39	0.24
Uniform Delay, d1	32.5	44.3		38.7	49.0		40.1	44.1	36.8	31.1	32.5	30.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.0	2.2		3.6	6.7		0.8	12.2	0.1	1.1	2.0	1.2
Delay (s)	38.4	46.5		42.3	55.7		40.9	56.3	36.9	32.3	34.5	32.1
Level of Service	D	D		D	E		D	E	D	C	C	C
Approach Delay (s)		44.2			52.4			48.5			32.8	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	43.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	60		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	140	285	25	66	372	261	23	42	33	185	98	128
Future Volume (vph)	140	285	25	66	372	261	23	42	33	185	98	128
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	6.0	6.0		6.0			6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		0.95			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.97	1.00
Satd. Flow (prot)	1785	3463		1750	3570	1581		1773			1808	1551
Flt Permitted	0.31	1.00		0.56	1.00	1.00		0.90			0.74	1.00
Satd. Flow (perm)	591	3463		1038	3570	1581		1617			1389	1551
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	140	285	25	66	372	261	23	42	33	185	98	128
RTOR Reduction (vph)	0	8	0	0	0	217	0	11	0	0	0	54
Lane Group Flow (vph)	140	302	0	66	372	44	0	87	0	0	283	74
Heavy Vehicles (%)	0%	2%	0%	2%	0%	1%	0%	0%	0%	1%	0%	3%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	34.3	34.3		18.5	18.5	18.5		63.7			63.7	63.7
Effective Green, g (s)	34.3	34.3		18.5	18.5	18.5		63.7			63.7	63.7
Actuated g/C Ratio	0.31	0.31		0.17	0.17	0.17		0.58			0.58	0.58
Clearance Time (s)	4.0	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)	312	1079		174	600	265		936			804	898
v/s Ratio Prot	c0.05	0.09			c0.10							
v/s Ratio Perm	0.09			0.06		0.03		0.05			c0.20	0.05
v/c Ratio	0.45	0.28		0.38	0.62	0.17		0.09			0.35	0.08
Uniform Delay, d1	28.7	28.5		40.6	42.5	39.1		10.3			12.2	10.2
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	1.0	0.1		1.4	1.9	0.3		0.2			0.3	0.2
Delay (s)	29.7	28.7		42.0	44.4	39.4		10.5			12.5	10.4
Level of Service	C	C		D	D	D		B			B	B
Approach Delay (s)		29.0			42.3			10.5			11.9	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	29.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	54.1%	ICU Level of Service	A
Analysis Period (min)	60		
c Critical Lane Group			

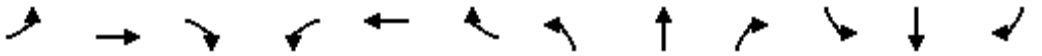


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	174	308	448	259	1	267	0	297	0	0	0
Future Volume (vph)	0	174	308	448	259	1	267	0	297	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0			6.0	6.0			
Lane Util. Factor		1.00	1.00	1.00	1.00			1.00	1.00			
Frpb, ped/bikes		1.00	0.99	1.00	1.00			1.00	0.99			
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00			
Frt		1.00	0.85	1.00	1.00			1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (prot)		1879	1574	1782	1878			1785	1563			
Flt Permitted		1.00	1.00	0.64	1.00			0.76	1.00			
Satd. Flow (perm)		1879	1574	1197	1878			1423	1563			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	189	335	487	282	1	290	0	323	0	0	0
RTOR Reduction (vph)	0	0	170	0	0	0	0	0	217	0	0	0
Lane Group Flow (vph)	0	189	165	487	283	0	0	290	106	0	0	0
Confl. Peds. (#/hr)	3		2	2		3			1	1		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	0
Turn Type		NA	Perm	Perm	NA		Perm	NA	Perm			
Protected Phases		4			8			2			6	
Permitted Phases			4	8			2		2	6		
Actuated Green, G (s)		32.7	32.7	32.7	32.7			21.8	21.8			
Effective Green, g (s)		32.7	32.7	32.7	32.7			21.8	21.8			
Actuated g/C Ratio		0.49	0.49	0.49	0.49			0.33	0.33			
Clearance Time (s)		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			
Lane Grp Cap (vph)		923	773	588	923			466	512			
v/s Ratio Prot		0.10			0.15							
v/s Ratio Perm			0.10	c0.41				c0.20	0.07			
v/c Ratio		0.20	0.21	0.83	0.31			0.62	0.21			
Uniform Delay, d1		9.6	9.6	14.5	10.1			18.9	16.1			
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00			
Incremental Delay, d2		0.1	0.1	9.4	0.2			6.1	0.9			
Delay (s)		9.7	9.7	23.9	10.3			25.0	17.0			
Level of Service		A	A	C	B			C	B			
Approach Delay (s)		9.7			18.9			20.8			0.0	
Approach LOS		A			B			C			A	

Intersection Summary			
HCM 2000 Control Delay	17.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	66.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	312	139	319	418	1	243	1	275	0	0	0
Future Volume (vph)	0	312	139	319	418	1	243	1	275	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	5.0	6.0			6.0	6.0			
Lane Util. Factor		1.00	1.00	1.00	1.00			1.00	1.00			
Frt		1.00	0.85	1.00	1.00			1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (prot)		1860	1581	1767	1878			1772	1581			
Flt Permitted		1.00	1.00	0.38	1.00			0.73	1.00			
Satd. Flow (perm)		1860	1581	705	1878			1353	1581			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	339	151	347	454	1	264	1	299	0	0	0
RTOR Reduction (vph)	0	0	96	0	0	0	0	0	183	0	0	0
Lane Group Flow (vph)	0	339	55	347	455	0	0	265	116	0	0	0
Heavy Vehicles (%)	0%	1%	1%	1%	0%	0%	1%	0%	1%	0%	0%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm			
Protected Phases		2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		
Actuated Green, G (s)		32.3	32.3	51.6	51.6			24.3	24.3			
Effective Green, g (s)		32.3	32.3	51.6	51.6			24.3	24.3			
Actuated g/C Ratio		0.37	0.37	0.59	0.59			0.28	0.28			
Clearance Time (s)		6.0	6.0	5.0	6.0			6.0	6.0			
Vehicle Extension (s)		3.0	3.0	3.0	3.0			3.0	3.0			
Lane Grp Cap (vph)		683	580	586	1102			374	437			
v/s Ratio Prot		0.18		c0.10	0.24							
v/s Ratio Perm			0.04	c0.25				c0.20	0.07			
v/c Ratio		0.50	0.10	0.59	0.41			0.71	0.27			
Uniform Delay, d1		21.5	18.2	10.5	9.9			28.6	24.8			
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00			
Incremental Delay, d2		2.6	0.3	1.6	0.3			6.0	0.3			
Delay (s)		24.1	18.6	12.1	10.1			34.7	25.2			
Level of Service		C	B	B	B			C	C			
Approach Delay (s)		22.4			11.0			29.6			0.0	
Approach LOS		C			B			C			A	

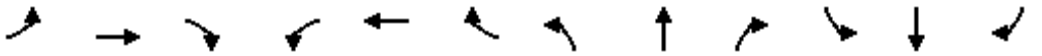
Intersection Summary			
HCM 2000 Control Delay	19.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	87.9	Sum of lost time (s)	17.0
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	318	404	296	221	492	61	289	256	174	217	295	431
Future Volume (vph)	318	404	296	221	492	61	289	256	174	217	295	431
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.94		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1784	3305		1750	3471		1696	1760	1553	1785	1879	1575
Flt Permitted	0.14	1.00		0.18	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	270	3305		323	3471		1696	1760	1553	1785	1879	1575
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)	346	439	322	240	535	66	314	278	189	236	321	468
RTOR Reduction (vph)	0	113	0	0	8	0	0	0	138	0	0	278
Lane Group Flow (vph)	346	648	0	240	593	0	283	309	51	236	321	190
Confl. Peds. (#/hr)	7		3	3		7	1		9	9		1
Heavy Vehicles (%)	0%	0%	1%	2%	1%	0%	0%	1%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	49.6	29.9		37.5	22.8		24.2	24.2	24.2	28.2	28.2	28.2
Effective Green, g (s)	49.6	29.9		37.5	22.8		24.2	24.2	24.2	28.2	28.2	28.2
Actuated g/C Ratio	0.41	0.25		0.31	0.19		0.20	0.20	0.20	0.23	0.23	0.23
Clearance Time (s)	5.0	6.0		5.0	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	3.0
Lane Grp Cap (vph)	386	823		275	659		342	354	313	419	441	370
v/s Ratio Prot	c0.16	0.20		0.11	0.17		0.17	c0.18		0.13	c0.17	
v/s Ratio Perm	c0.21			0.17					0.03			0.12
v/c Ratio	0.90	0.79		0.87	0.90		0.83	0.87	0.16	0.56	0.73	0.51
Uniform Delay, d1	32.6	42.1		33.9	47.5		45.9	46.4	39.5	40.5	42.4	39.9
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	22.4	5.0		24.8	15.1		15.1	20.4	0.2	5.4	10.1	5.0
Delay (s)	55.0	47.1		58.7	62.6		61.0	66.8	39.8	45.9	52.4	44.9
Level of Service	E	D		E	E		E	E	D	D	D	D
Approach Delay (s)		49.6			61.5			58.1			47.5	
Approach LOS		D			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	53.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		

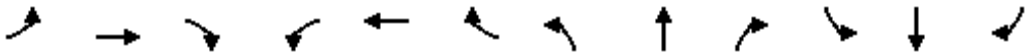
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	174	561	24	58	560	250	36	148	59	282	49	132
Future Volume (vph)	174	561	24	58	560	250	36	148	59	282	49	132
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	6.0	6.0		6.0			6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.97		1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.96	1.00
Satd. Flow (prot)	1785	3511		1783	3570	1539		1782			1785	1522
Flt Permitted	0.17	1.00		0.41	1.00	1.00		0.91			0.58	1.00
Satd. Flow (perm)	314	3511		770	3570	1539		1629			1086	1522
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)	189	610	26	63	609	272	39	161	64	307	53	143
RTOR Reduction (vph)	0	3	0	0	0	213	0	9	0	0	0	67
Lane Group Flow (vph)	189	633	0	63	609	59	0	255	0	0	360	76
Confl. Peds. (#/hr)	3		1	1		3	4		1	1		4
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	0%	1%	1%	1%	0%	3%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	39.3	39.3		23.7	23.7	23.7		58.7			58.7	58.7
Effective Green, g (s)	39.3	39.3		23.7	23.7	23.7		58.7			58.7	58.7
Actuated g/C Ratio	0.36	0.36		0.22	0.22	0.22		0.53			0.53	0.53
Clearance Time (s)	4.0	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)	267	1254		165	769	331		869			579	812
v/s Ratio Prot	c0.07	0.18			c0.17							
v/s Ratio Perm	0.18			0.08		0.04		0.16			c0.33	0.05
v/c Ratio	0.71	0.51		0.38	0.79	0.18		0.29			0.62	0.09
Uniform Delay, d1	27.1	27.7		36.9	40.8	35.2		14.2			17.9	12.6
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	8.3	0.3		1.5	5.6	0.3		0.9			2.1	0.2
Delay (s)	35.4	28.0		38.4	46.4	35.5		15.0			20.0	12.8
Level of Service	D	C		D	D	D		B			B	B
Approach Delay (s)		29.7			42.7			15.0			17.9	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	30.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		

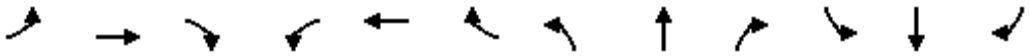
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	264	455	407	309	0	326	0	357	0	0	0
Future Volume (vph)	0	264	455	407	309	0	326	0	357	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0			6.0	6.0			
Lane Util. Factor		1.00	1.00	1.00	1.00			1.00	1.00			
Frt		1.00	0.85	1.00	1.00			1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (prot)		1879	1597	1785	1879			1785	1569			
Flt Permitted		1.00	1.00	0.57	1.00			0.76	1.00			
Satd. Flow (perm)		1879	1597	1072	1879			1423	1569			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	287	495	442	336	0	354	0	388	0	0	0
RTOR Reduction (vph)	0	0	254	0	0	0	0	0	256	0	0	0
Lane Group Flow (vph)	0	287	241	442	336	0	0	354	132	0	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	0
Turn Type		NA	Perm	Perm	NA		Perm	NA	Perm			
Protected Phases		4			8			2			6	
Permitted Phases			4	8			2		2	6		
Actuated Green, G (s)		33.9	33.9	33.9	33.9			23.8	23.8			
Effective Green, g (s)		33.9	33.9	33.9	33.9			23.8	23.8			
Actuated g/C Ratio		0.49	0.49	0.49	0.49			0.34	0.34			
Clearance Time (s)		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			
Lane Grp Cap (vph)		913	776	521	913			485	535			
v/s Ratio Prot		0.15			0.18							
v/s Ratio Perm			0.15	c0.41				c0.25	0.08			
v/c Ratio		0.31	0.31	0.85	0.37			0.73	0.25			
Uniform Delay, d1		10.9	10.8	15.7	11.2			20.1	16.5			
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00			
Incremental Delay, d2		0.2	0.2	12.2	0.3			9.3	1.1			
Delay (s)		11.1	11.1	27.9	11.5			29.4	17.6			
Level of Service		B	B	C	B			C	B			
Approach Delay (s)		11.1			20.8			23.3			0.0	
Approach LOS		B			C			C			A	

Intersection Summary			
HCM 2000 Control Delay	18.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	69.7	Sum of lost time (s)	12.0
Intersection Capacity Utilization	69.5%	ICU Level of Service	C
Analysis Period (min)	15		

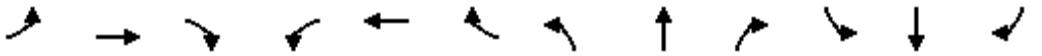
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	419	153	434	377	1	271	0	435	0	0	1
Future Volume (vph)	1	419	153	434	377	1	271	0	435	0	0	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0	5.0	6.0			6.0	6.0		6.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00			1.00	1.00		0.98	
Flpb, ped/bikes	0.99	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			1.00	0.85		0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.95	1.00		1.00	
Satd. Flow (prot)	1775	1860	1597	1767	1878			1777	1597		1587	
Flt Permitted	0.52	1.00	1.00	0.24	1.00			0.76	1.00		1.00	
Satd. Flow (perm)	974	1860	1597	453	1878			1416	1597		1587	
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)	1	455	166	472	410	1	295	0	473	0	0	1
RTOR Reduction (vph)	0	0	107	0	0	0	0	0	251	0	1	0
Lane Group Flow (vph)	1	455	59	472	411	0	0	295	222	0	0	0
Confl. Peds. (#/hr)	4					4	2					2
Heavy Vehicles (%)	0%	1%	0%	1%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	pm+pt	NA		Perm	NA	Perm		NA	
Protected Phases		2		1	6			4			8	
Permitted Phases	2		2	6			4		4	8		
Actuated Green, G (s)	33.3	33.3	33.3	57.9	57.9			24.5	24.5		24.5	
Effective Green, g (s)	33.3	33.3	33.3	57.9	57.9			24.5	24.5		24.5	
Actuated g/C Ratio	0.35	0.35	0.35	0.61	0.61			0.26	0.26		0.26	
Clearance Time (s)	6.0	6.0	6.0	5.0	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)	343	656	563	550	1151			367	414		411	
v/s Ratio Prot		0.24		c0.18	0.22						0.00	
v/s Ratio Perm	0.00		0.04	c0.35				c0.21	0.14			
v/c Ratio	0.00	0.69	0.10	0.86	0.36			0.80	0.54		0.00	
Uniform Delay, d1	19.8	26.2	20.5	14.6	9.0			32.7	30.1		25.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2	0.0	6.0	0.4	12.6	0.2			12.0	1.3		0.0	
Delay (s)	19.8	32.1	20.9	27.2	9.2			44.7	31.4		25.9	
Level of Service	B	C	C	C	A			D	C		C	
Approach Delay (s)		29.1			18.8			36.5			25.9	
Approach LOS		C			B			D			C	

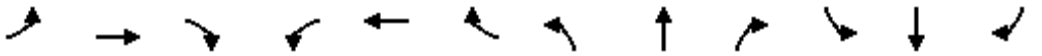
Intersection Summary			
HCM 2000 Control Delay	27.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	94.4	Sum of lost time (s)	17.0
Intersection Capacity Utilization	81.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	391	520	247	191	637	88	323	309	203	261	334	423
Future Volume (vph)	391	520	247	191	637	88	323	309	203	261	334	423
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		6.0	6.0	6.0	6.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		0.95	0.95	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1785	3360		1784	3449		1696	1761	1551	1785	1879	1557
Flt Permitted	0.13	1.00		0.18	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	251	3360		330	3449		1696	1761	1551	1785	1879	1557
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)	425	565	268	208	692	96	351	336	221	284	363	460
RTOR Reduction (vph)	0	47	0	0	9	0	0	0	137	0	0	257
Lane Group Flow (vph)	425	786	0	208	779	0	316	371	84	284	363	204
Confl. Peds. (#/hr)	15		7	7		15	7		9	9		7
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	0%	0%	1%	0%	1%	2%	0%	1%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	Perm
Protected Phases	7	4		3	8		2	2		6	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	52.0	34.5		37.5	25.0		25.0	25.0	25.0	25.0	25.0	25.0
Effective Green, g (s)	52.0	34.5		37.5	25.0		25.0	25.0	25.0	25.0	25.0	25.0
Actuated g/C Ratio	0.43	0.29		0.31	0.21		0.21	0.21	0.21	0.21	0.21	0.21
Clearance Time (s)	5.0	6.0		5.0	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	3.0
Lane Grp Cap (vph)	390	966		254	718		353	366	323	371	391	324
v/s Ratio Prot	c0.20	0.23		0.09	0.23		0.19	c0.21		0.16	c0.19	
v/s Ratio Perm	c0.27			0.17					0.05			0.13
v/c Ratio	1.09	0.81		0.82	1.09		0.90	1.01	0.26	0.77	0.93	0.63
Uniform Delay, d1	36.0	39.8		33.0	47.5		46.2	47.5	39.8	44.7	46.6	43.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	71.9	5.3		18.2	59.1		23.8	50.5	0.4	14.0	30.6	8.9
Delay (s)	107.9	45.1		51.2	106.6		70.1	98.0	40.2	58.7	77.2	52.2
Level of Service	F	D		D	F		E	F	D	E	E	D
Approach Delay (s)		66.3			95.1			74.2			62.1	
Approach LOS		E			F			E			E	

Intersection Summary			
HCM 2000 Control Delay	73.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	23.0
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	210	626	27	94	575	378	57	130	72	270	118	288
Future Volume (vph)	210	626	27	94	575	378	57	130	72	270	118	288
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	6.0	6.0		6.0			6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00		1.00			1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98		1.00			1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		0.96			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99			0.97	1.00
Satd. Flow (prot)	1785	3544		1782	3535	1558		1783			1816	1557
Flt Permitted	0.18	1.00		0.38	1.00	1.00		0.83			0.62	1.00
Satd. Flow (perm)	331	3544		717	3535	1558		1504			1165	1557
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)	228	680	29	102	625	411	62	141	78	293	128	313
RTOR Reduction (vph)	0	3	0	0	0	316	0	10	0	0	0	149
Lane Group Flow (vph)	228	706	0	102	625	95	0	271	0	0	421	164
Confl. Peds. (#/hr)	2		2	2		2	2					2
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	1%	0%	0%	1%
Turn Type	pm+pt	NA		Perm	NA	Perm	Perm	NA		pm+pt	NA	Perm
Protected Phases	7	4			8			2		1	6	
Permitted Phases	4			8		8	2			6		6
Actuated Green, G (s)	40.4	40.4		25.4	25.4	25.4		57.6			57.6	57.6
Effective Green, g (s)	40.4	40.4		25.4	25.4	25.4		57.6			57.6	57.6
Actuated g/C Ratio	0.37	0.37		0.23	0.23	0.23		0.52			0.52	0.52
Clearance Time (s)	4.0	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)	266	1301		165	816	359		787			610	815
v/s Ratio Prot	c0.09	0.20			0.18							
v/s Ratio Perm	c0.23			0.14		0.06		0.18			c0.36	0.11
v/c Ratio	0.86	0.54		0.62	0.77	0.26		0.34			0.69	0.20
Uniform Delay, d1	27.1	27.5		37.9	39.5	34.6		15.2			19.5	13.9
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	22.8	0.5		6.7	4.3	0.4		1.2			3.4	0.6
Delay (s)	49.9	28.0		44.7	43.8	35.0		16.4			22.9	14.5
Level of Service	D	C		D	D	D		B			C	B
Approach Delay (s)		33.3			40.7			16.4			19.3	
Approach LOS		C			D			B			B	

Intersection Summary			
HCM 2000 Control Delay	31.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	20.0
Intersection Capacity Utilization	82.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	212	297	239	129	352	47	181	296	107	143	222	371
Future Volume (vph)	212	297	239	129	352	47	181	296	107	143	222	371
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0	6.0	5.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.98	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.93		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1784	3253		1783	3466		1784	1860	1548	1781	3535	1559
Flt Permitted	0.25	1.00		0.30	1.00		0.60	1.00	1.00	0.51	1.00	1.00
Satd. Flow (perm)	466	3253		565	3466		1127	1860	1548	961	3535	1559
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	212	297	239	129	352	47	181	296	107	143	222	371
RTOR Reduction (vph)	0	132	0	0	9	0	0	0	59	0	0	209
Lane Group Flow (vph)	212	404	0	129	390	0	181	296	48	143	222	162
Confl. Peds. (#/hr)	2		5	5		2	1		5	5		1
Heavy Vehicles (%)	0%	1%	2%	0%	1%	0%	0%	1%	1%	0%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	40.1	24.3		29.6	18.8		64.0	53.5	53.5	61.8	52.4	52.4
Effective Green, g (s)	40.1	24.3		29.6	18.8		64.0	53.5	53.5	61.8	52.4	52.4
Actuated g/C Ratio	0.33	0.20		0.25	0.16		0.53	0.45	0.45	0.51	0.44	0.44
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0	6.0	5.0	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	3.0
Lane Grp Cap (vph)	334	658		248	543		658	829	690	559	1543	680
v/s Ratio Prot	c0.09	0.12		0.05	c0.11		c0.02	c0.16		0.02	0.06	
v/s Ratio Perm	0.13			0.08			0.12		0.03	0.11		0.10
v/c Ratio	0.63	0.61		0.52	0.72		0.28	0.36	0.07	0.26	0.14	0.24
Uniform Delay, d1	31.0	43.6		36.9	48.1		14.5	21.9	19.0	15.5	20.3	21.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.0	1.7		2.0	4.6		0.2	1.2	0.2	0.2	0.2	0.8
Delay (s)	35.0	45.3		38.9	52.7		14.8	23.1	19.2	15.8	20.5	22.1
Level of Service	C	D		D	D		B	C	B	B	C	C
Approach Delay (s)		42.4			49.3			19.8			20.4	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	32.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	60		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	318	404	296	221	492	61	289	256	174	217	295	431
Future Volume (vph)	318	404	296	221	492	61	289	256	174	217	295	431
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0	6.0	5.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.94		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1784	3305		1750	3465		1784	1860	1553	1778	3570	1575
Flt Permitted	0.14	1.00		0.18	1.00		0.49	1.00	1.00	0.47	1.00	1.00
Satd. Flow (perm)	267	3305		340	3465		923	1860	1553	874	3570	1575
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)	346	439	322	240	535	66	314	278	189	236	321	468
RTOR Reduction (vph)	0	114	0	0	8	0	0	0	113	0	0	315
Lane Group Flow (vph)	346	647	0	240	593	0	314	278	76	236	321	153
Confl. Peds. (#/hr)	7		3	3		7	1		9	9		1
Heavy Vehicles (%)	0%	0%	1%	2%	1%	0%	0%	1%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	52.0	31.6		39.6	24.2		52.7	37.4	37.4	49.3	35.7	35.7
Effective Green, g (s)	52.0	31.6		39.6	24.2		52.7	37.4	37.4	49.3	35.7	35.7
Actuated g/C Ratio	0.43	0.26		0.33	0.20		0.44	0.31	0.31	0.41	0.30	0.30
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0	6.0	5.0	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	3.0
Lane Grp Cap (vph)	403	870		293	698		515	579	484	461	1062	468
v/s Ratio Prot	c0.16	0.20		0.11	0.17		c0.08	0.15		0.06	0.09	
v/s Ratio Perm	c0.21			0.17			c0.19		0.05	0.15		0.10
v/c Ratio	0.86	0.74		0.82	0.85		0.61	0.48	0.16	0.51	0.30	0.33
Uniform Delay, d1	31.3	40.5		32.1	46.1		23.0	33.4	29.9	24.3	32.5	32.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.4	3.5		16.2	9.5		2.1	2.8	0.7	1.0	0.7	1.8
Delay (s)	47.7	44.0		48.3	55.7		25.1	36.3	30.6	25.3	33.3	34.6
Level of Service	D	D		D	E		C	D	C	C	C	C
Approach Delay (s)		45.1			53.6			30.4			32.1	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	40.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	391	520	247	191	637	88	323	309	203	261	334	423
Future Volume (vph)	391	520	247	191	637	88	323	309	203	261	334	423
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	6.0	6.0	5.0	6.0	6.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1785	3360		1784	3438		1781	1860	1551	1781	3570	1557
Flt Permitted	0.12	1.00		0.26	1.00		0.41	1.00	1.00	0.34	1.00	1.00
Satd. Flow (perm)	235	3360		488	3438		764	1860	1551	645	3570	1557
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)	425	565	268	208	692	96	351	336	221	284	363	460
RTOR Reduction (vph)	0	47	0	0	9	0	0	0	120	0	0	307
Lane Group Flow (vph)	425	786	0	208	779	0	351	336	101	284	363	153
Confl. Peds. (#/hr)	15		7	7		15	7		9	9		7
Confl. Bikes (#/hr)						1			1			1
Heavy Vehicles (%)	0%	0%	1%	0%	1%	2%	0%	1%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		pm+pt	NA	Perm	pm+pt	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2		2	6		6
Actuated Green, G (s)	57.0	40.4		38.6	27.0		48.9	32.2	32.2	43.1	29.3	29.3
Effective Green, g (s)	57.0	40.4		38.6	27.0		48.9	32.2	32.2	43.1	29.3	29.3
Actuated g/C Ratio	0.48	0.34		0.32	0.22		0.41	0.27	0.27	0.36	0.24	0.24
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	6.0	6.0	5.0	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	3.0
Lane Grp Cap (vph)	434	1131		282	773		452	499	416	362	871	380
v/s Ratio Prot	c0.20	0.23		0.07	0.23		c0.11	0.18		0.09	0.10	
v/s Ratio Perm	c0.26			0.17			c0.21		0.07	0.19		0.10
v/c Ratio	0.98	0.69		0.74	1.01		0.78	0.67	0.24	0.78	0.42	0.40
Uniform Delay, d1	35.7	34.5		31.5	46.5		26.9	39.2	34.4	30.6	38.2	38.0
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	37.3	1.9		9.7	34.2		8.2	7.1	1.4	10.6	1.5	3.2
Delay (s)	73.0	36.3		41.1	80.7		35.1	46.3	35.7	41.2	39.6	41.2
Level of Service	E	D		D	F		D	D	D	D	D	D
Approach Delay (s)		48.7			72.4			39.4			40.7	
Approach LOS		D			E			D			D	

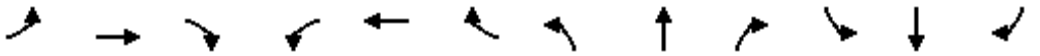
Intersection Summary			
HCM 2000 Control Delay	50.2	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.0
Intersection Capacity Utilization	95.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX

C *CRITICAL INTERSECTION TAFFIC ANALYSIS REPORTS*

APPENDIX

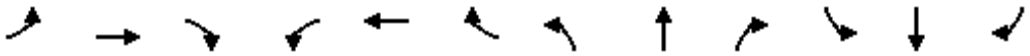
C-1 *REDUCED EXTENSION ALTERNATIVE*



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	297	242	35	208	3	281	23	46	7	67	20
Future Volume (vph)	3	297	242	35	208	3	281	23	46	7	67	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	1.00		1.00	0.90		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	3083		1552	3494		1518	1556		1785	1708	
Flt Permitted	0.61	1.00		0.36	1.00		0.70	1.00		0.71	1.00	
Satd. Flow (perm)	1144	3083		581	3494		1111	1556		1331	1708	
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)	3	323	263	38	226	3	305	25	50	8	73	22
RTOR Reduction (vph)	0	109	0	0	1	0	0	34	0	0	12	0
Lane Group Flow (vph)	3	477	0	38	228	0	305	41	0	8	83	0
Confl. Peds. (#/hr)							6					6
Heavy Vehicles (%)	0%	8%	8%	15%	2%	0%	17%	8%	9%	0%	6%	5%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	37.3	36.0		43.3	39.0		27.1	27.1		27.1	27.1	
Effective Green, g (s)	37.3	36.0		43.3	39.0		27.1	27.1		27.1	27.1	
Actuated g/C Ratio	0.45	0.43		0.52	0.47		0.32	0.32		0.32	0.32	
Clearance Time (s)	4.0	6.0		4.0	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)	521	1330		351	1633		361	505		432	554	
v/s Ratio Prot	0.00	c0.15		c0.01	0.07			0.03			0.05	
v/s Ratio Perm	0.00			0.05			c0.27			0.01		
v/c Ratio	0.01	0.36		0.11	0.14		0.84	0.08		0.02	0.15	
Uniform Delay, d1	12.8	15.9		10.2	12.6		26.2	19.5		19.1	20.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.8		0.1	0.2		16.4	0.1		0.0	0.1	
Delay (s)	12.8	16.7		10.3	12.8		42.6	19.6		19.1	20.1	
Level of Service	B	B		B	B		D	B		B	C	
Approach Delay (s)		16.7			12.5			38.0			20.0	
Approach LOS		B			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	22.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	83.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	16	226	251	44	54	2	126	181	18	2	489	22
Future Volume (vph)	16	226	251	44	54	2	126	181	18	2	489	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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	1.00		1.00	1.00		1.00	0.95		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.92		1.00	1.00		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1638	1614		1699	1675		1733	3405		1785	1845	
Flt Permitted	0.72	1.00		0.22	1.00		0.32	1.00		0.62	1.00	
Satd. Flow (perm)	1236	1614		392	1675		583	3405		1157	1845	
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)	17	246	273	48	59	2	137	197	20	2	532	24
RTOR Reduction (vph)	0	50	0	0	1	0	0	6	0	0	1	0
Lane Group Flow (vph)	17	469	0	48	60	0	137	212	0	2	555	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	9%	6%	7%	5%	12%	0%	3%	2%	17%	0%	1%	5%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	28.5	28.5		28.5	28.5		40.5	40.5		40.5	40.5	
Effective Green, g (s)	28.5	28.5		28.5	28.5		40.5	40.5		40.5	40.5	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.50	0.50		0.50	0.50	
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)	434	567		137	589		291	1702		578	922	
v/s Ratio Prot		c0.29			0.04			0.06			c0.30	
v/s Ratio Perm	0.01			0.12			0.23			0.00		
v/c Ratio	0.04	0.83		0.35	0.10		0.47	0.12		0.00	0.60	
Uniform Delay, d1	17.3	24.0		19.4	17.6		13.2	10.8		10.1	14.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	9.6		1.6	0.1		5.4	0.2		0.0	2.9	
Delay (s)	17.3	33.6		21.0	17.7		18.6	10.9		10.2	17.4	
Level of Service	B	C		C	B		B	B		B	B	
Approach Delay (s)		33.1			19.1			13.9			17.4	
Approach LOS		C			B			B			B	

Intersection Summary			
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	222	66	236	105	94	375
Future Volume (vph)	222	66	236	105	94	375
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	241	72	257	114	102	408

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	241	72	257	114	102	408
Volume Left (vph)	241	0	0	0	102	0
Volume Right (vph)	0	72	0	114	0	0
Hadj (s)	0.74	-0.55	0.41	-0.50	0.52	0.15
Departure Headway (s)	7.6	6.3	6.8	5.9	6.8	6.4
Degree Utilization, x	0.51	0.13	0.49	0.19	0.19	0.72
Capacity (veh/h)	445	535	501	577	512	547
Control Delay (s)	16.9	9.0	15.0	9.1	10.1	23.1
Approach Delay (s)	15.1		13.2		20.5	
Approach LOS	C		B		C	

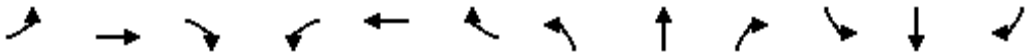
Intersection Summary			
Delay	16.8		
Level of Service	C		
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	3	220	50	20	32	217	258	102	63	674	90
Future Volume (vph)	45	3	220	50	20	32	217	258	102	63	674	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	5.0	7.0	7.0	7.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1566	1842	1493	3395	1842	1566	1733	3216	1566	1750	3389	
Flt Permitted	0.74	1.00	1.00	0.95	1.00	1.00	0.22	1.00	1.00	0.58	1.00	
Satd. Flow (perm)	1225	1842	1493	3395	1842	1566	395	3216	1566	1068	3389	
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)	49	3	239	54	22	35	236	280	111	68	733	98
RTOR Reduction (vph)	0	0	209	0	0	25	0	0	46	0	8	0
Lane Group Flow (vph)	49	3	30	54	22	10	236	280	65	68	823	0
Heavy Vehicles (%)	14%	2%	7%	2%	2%	2%	3%	11%	2%	2%	3%	7%
Turn Type	Perm	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4		4			8	2		2	6		
Actuated Green, G (s)	12.6	12.6	12.6	9.2	28.3	28.3	59.4	59.4	59.4	42.1	42.1	
Effective Green, g (s)	12.6	12.6	12.6	9.2	28.3	28.3	59.4	59.4	59.4	42.1	42.1	
Actuated g/C Ratio	0.12	0.12	0.12	0.09	0.28	0.28	0.59	0.59	0.59	0.42	0.42	
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	5.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	152	229	185	308	515	437	394	1887	919	444	1409	
v/s Ratio Prot		0.00		c0.02	0.01		c0.07	0.09			0.24	
v/s Ratio Perm	c0.04		0.02			0.01	c0.28		0.04	0.06		
v/c Ratio	0.32	0.01	0.16	0.18	0.04	0.02	0.60	0.15	0.07	0.15	0.58	
Uniform Delay, d1	40.4	38.8	39.6	42.5	26.6	26.4	12.3	9.5	9.0	18.4	22.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.2	0.0	0.4	0.3	0.0	0.0	2.5	0.2	0.1	0.7	1.8	
Delay (s)	41.6	38.9	40.0	42.8	26.6	26.4	14.7	9.6	9.2	19.2	24.6	
Level of Service	D	D	D	D	C	C	B	A	A	B	C	
Approach Delay (s)		40.3			34.4			11.5			24.2	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM 2000 Control Delay	23.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	101.2	Sum of lost time (s)	25.0
Intersection Capacity Utilization	60.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	282	249	35	316	14	242	33	35	6	11	19
Future Volume (vph)	21	282	249	35	316	14	242	33	35	6	11	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.93		1.00	0.99		1.00	0.92		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	3319		1785	3547		1785	1734		1785	1700	
Flt Permitted	0.54	1.00		0.40	1.00		0.74	1.00		0.71	1.00	
Satd. Flow (perm)	1010	3319		744	3547		1382	1734		1332	1700	
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)	23	307	271	38	343	15	263	36	38	7	12	21
RTOR Reduction (vph)	0	110	0	0	2	0	0	29	0	0	16	0
Lane Group Flow (vph)	23	468	0	38	356	0	263	45	0	7	17	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	44.2	41.4		47.2	42.9		20.4	20.4		20.4	20.4	
Effective Green, g (s)	44.2	41.4		47.2	42.9		20.4	20.4		20.4	20.4	
Actuated g/C Ratio	0.54	0.50		0.57	0.52		0.25	0.25		0.25	0.25	
Clearance Time (s)	4.0	6.0		4.0	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)	570	1673		482	1853		343	430		330	422	
v/s Ratio Prot	0.00	c0.14		c0.00	0.10			0.03			0.01	
v/s Ratio Perm	0.02			0.04			c0.19			0.01		
v/c Ratio	0.04	0.28		0.08	0.19		0.77	0.11		0.02	0.04	
Uniform Delay, d1	8.9	11.7		7.7	10.4		28.6	23.8		23.3	23.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.4		0.1	0.2		9.8	0.1		0.0	0.0	
Delay (s)	8.9	12.2		7.7	10.6		38.5	23.9		23.3	23.5	
Level of Service	A	B		A	B		D	C		C	C	
Approach Delay (s)		12.0			10.4			35.3			23.4	
Approach LOS		B			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	17.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	82.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	55.9%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



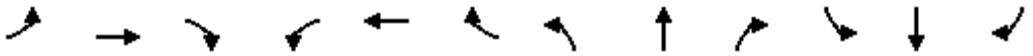
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	40	214	22	47	5	267	608	23	1	463	27
Future Volume (vph)	36	40	214	22	47	5	267	608	23	1	463	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	1.00	
Frt	1.00	0.87		1.00	0.99		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	1641		1638	1854		1785	3539		1785	1864	
Flt Permitted	0.72	1.00		0.31	1.00		0.29	1.00		0.39	1.00	
Satd. Flow (perm)	1354	1641		539	1854		536	3539		734	1864	
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)	39	43	233	24	51	5	290	661	25	1	503	29
RTOR Reduction (vph)	0	197	0	0	4	0	0	1	0	0	2	0
Lane Group Flow (vph)	39	79	0	24	52	0	290	685	0	1	530	0
Heavy Vehicles (%)	0%	0%	0%	9%	0%	0%	0%	0%	9%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	12.8	12.8		12.8	12.8		58.0	58.0		40.1	40.1	
Effective Green, g (s)	12.8	12.8		12.8	12.8		58.0	58.0		40.1	40.1	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.70	0.70		0.48	0.48	
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)	209	253		83	286		554	2479		355	902	
v/s Ratio Prot		c0.05			0.03		c0.08	0.19			c0.28	
v/s Ratio Perm	0.03			0.04			0.29			0.00		
v/c Ratio	0.19	0.31		0.29	0.18		0.52	0.28		0.00	0.59	
Uniform Delay, d1	30.5	31.1		31.0	30.4		7.3	4.6		11.0	15.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	0.7		1.9	0.3		0.9	0.3		0.0	2.8	
Delay (s)	30.9	31.8		32.9	30.7		8.2	4.9		11.0	18.2	
Level of Service	C	C		C	C		A	A		B	B	
Approach Delay (s)		31.7			31.4			5.9			18.2	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	82.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	179	172	251	174	90	228
Future Volume (vph)	179	172	251	174	90	228
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	195	187	273	189	98	248

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	195	187	273	189	98	248
Volume Left (vph)	195	0	0	0	98	0
Volume Right (vph)	0	187	0	189	0	0
Hadj (s)	0.55	-0.70	0.00	-0.67	0.50	0.00
Departure Headway (s)	7.1	5.8	6.2	5.5	6.8	6.3
Degree Utilization, x	0.38	0.30	0.47	0.29	0.19	0.44
Capacity (veh/h)	483	581	561	623	502	548
Control Delay (s)	13.2	10.2	13.5	9.6	10.2	13.0
Approach Delay (s)	11.7		11.9		12.2	
Approach LOS	B		B		B	

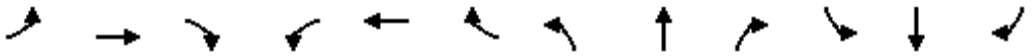
Intersection Summary			
Delay	11.9		
Level of Service	B		
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	43	162	293	75	205	259	690	293	194	496	55
Future Volume (vph)	34	43	162	293	75	205	259	690	293	194	496	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	4.0	4.0	4.0	5.0	7.0	7.0	4.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1608	1879	1574	3463	1879	1597	1750	3570	1597	1785	3516	
Flt Permitted	0.70	1.00	1.00	0.95	1.00	1.00	0.27	1.00	1.00	0.29	1.00	
Satd. Flow (perm)	1191	1879	1574	3463	1879	1597	500	3570	1597	546	3516	
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)	37	47	176	318	82	223	282	750	318	211	539	60
RTOR Reduction (vph)	0	0	147	0	0	172	0	0	211	0	7	0
Lane Group Flow (vph)	37	47	29	318	82	51	282	750	107	211	592	0
Confl. Peds. (#/hr)			3									
Heavy Vehicles (%)	11%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4			8	2		2	6		
Actuated Green, G (s)	21.8	14.8	14.8	13.1	20.9	20.9	44.6	30.6	30.6	36.8	26.2	
Effective Green, g (s)	21.8	14.8	14.8	13.1	20.9	20.9	44.6	30.6	30.6	36.8	26.2	
Actuated g/C Ratio	0.24	0.16	0.16	0.14	0.23	0.23	0.49	0.34	0.34	0.41	0.29	
Clearance Time (s)	6.5	6.5	6.5	4.0	4.0	4.0	5.0	7.0	7.0	4.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	318	306	257	500	433	368	439	1205	539	366	1016	
v/s Ratio Prot	0.01	0.03		c0.09	c0.04		c0.10	0.21		0.07	0.17	
v/s Ratio Perm	0.02		0.02			0.03	c0.22		0.07	0.17		
v/c Ratio	0.12	0.15	0.11	0.64	0.19	0.14	0.64	0.62	0.20	0.58	0.58	
Uniform Delay, d1	26.7	32.5	32.3	36.5	28.0	27.7	15.0	25.2	21.3	18.4	27.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.2	0.2	2.6	0.2	0.2	3.2	2.4	0.8	2.2	2.4	
Delay (s)	26.9	32.8	32.5	39.2	28.2	27.9	18.2	27.6	22.1	20.5	30.0	
Level of Service	C	C	C	D	C	C	B	C	C	C	C	
Approach Delay (s)		31.7			33.7			24.3			27.5	
Approach LOS		C			C			C			C	

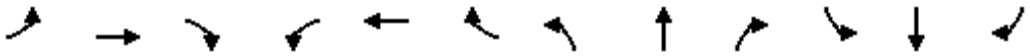
Intersection Summary			
HCM 2000 Control Delay	27.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	90.6	Sum of lost time (s)	22.5
Intersection Capacity Utilization	59.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	322	125	69	207	6	264	27	77	6	53	12
Future Volume (vph)	4	322	125	69	207	6	264	27	77	6	53	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	1.00		1.00	0.89		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	3400		1785	3554		1741	1669		1785	1821	
Flt Permitted	0.61	1.00		0.41	1.00		0.71	1.00		0.68	1.00	
Satd. Flow (perm)	1141	3400		777	3554		1302	1669		1286	1821	
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)	4	350	136	75	225	7	287	29	84	7	58	13
RTOR Reduction (vph)	0	29	0	0	1	0	0	61	0	0	9	0
Lane Group Flow (vph)	4	457	0	75	231	0	287	52	0	7	62	0
Confl. Peds. (#/hr)							6					6
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	40.1	38.8		49.2	43.9		23.2	23.2		23.2	23.2	
Effective Green, g (s)	40.1	38.8		49.2	43.9		23.2	23.2		23.2	23.2	
Actuated g/C Ratio	0.48	0.46		0.58	0.52		0.27	0.27		0.27	0.27	
Clearance Time (s)	4.0	6.0		4.0	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)	552	1563		529	1848		357	458		353	500	
v/s Ratio Prot	0.00	c0.13		c0.01	0.06			0.03			0.03	
v/s Ratio Perm	0.00			0.07			c0.22			0.01		
v/c Ratio	0.01	0.29		0.14	0.12		0.80	0.11		0.02	0.12	
Uniform Delay, d1	11.7	14.2		7.9	10.4		28.5	22.9		22.3	23.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.5		0.1	0.1		12.3	0.1		0.0	0.1	
Delay (s)	11.7	14.7		8.0	10.5		40.8	23.0		22.3	23.1	
Level of Service	B	B		A	B		D	C		C	C	
Approach Delay (s)		14.7			9.9			35.8			23.0	
Approach LOS		B			A			D			C	

Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	84.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	72	35	220	10	34	4	125	413	8	1	552	74
Future Volume (vph)	72	35	220	10	34	4	125	413	8	1	552	74
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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	1.00		1.00	1.00		1.00	0.95		1.00	1.00	
Frt	1.00	0.87		1.00	0.99		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	1636		1785	1851		1785	3559		1785	1846	
Flt Permitted	0.73	1.00		0.30	1.00		0.25	1.00		0.49	1.00	
Satd. Flow (perm)	1372	1636		569	1851		472	3559		917	1846	
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)	78	38	239	11	37	4	136	449	9	1	600	80
RTOR Reduction (vph)	0	206	0	0	3	0	0	1	0	0	4	0
Lane Group Flow (vph)	78	71	0	11	38	0	136	457	0	1	676	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	13.2	13.2		13.2	13.2		71.0	71.0		56.7	56.7	
Effective Green, g (s)	13.2	13.2		13.2	13.2		71.0	71.0		56.7	56.7	
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.74	0.74		0.59	0.59	
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)	188	224		78	253		461	2626		540	1088	
v/s Ratio Prot		0.04			0.02		c0.03	0.13			c0.37	
v/s Ratio Perm	c0.06			0.02			0.19			0.00		
v/c Ratio	0.41	0.32		0.14	0.15		0.30	0.17		0.00	0.62	
Uniform Delay, d1	38.0	37.4		36.5	36.5		7.2	3.8		8.1	12.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	0.8		0.8	0.3		0.4	0.1		0.0	2.7	
Delay (s)	39.5	38.2		37.3	36.8		7.6	3.9		8.1	15.5	
Level of Service	D	D		D	D		A	A		A	B	
Approach Delay (s)		38.5			36.9			4.8			15.5	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	17.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	96.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	70.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	167	109	270	127	88	310
Future Volume (vph)	167	109	270	127	88	310
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	182	118	293	138	96	337

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	182	118	293	138	96	337
Volume Left (vph)	182	0	0	0	96	0
Volume Right (vph)	0	118	0	138	0	0
Hadj (s)	0.50	-0.67	0.00	-0.70	0.50	0.03
Departure Headway (s)	7.1	6.0	6.1	5.4	6.6	6.1
Degree Utilization, x	0.36	0.20	0.50	0.21	0.18	0.57
Capacity (veh/h)	474	559	573	638	524	575
Control Delay (s)	12.9	9.2	13.8	8.6	9.8	15.7
Approach Delay (s)	11.5		12.1		14.4	
Approach LOS	B		B		B	

Intersection Summary			
Delay	12.8		
Level of Service	B		
Intersection Capacity Utilization	38.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	49	73	375	108	257	221	263	458	297	528	58
Future Volume (vph)	36	49	73	375	108	257	221	263	458	297	528	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	5.0	7.0	7.0	5.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1785	1879	1597	3463	1879	1597	1785	3570	1597	1785	3517	
Flt Permitted	0.68	1.00	1.00	0.95	1.00	1.00	0.34	1.00	1.00	0.55	1.00	
Satd. Flow (perm)	1281	1879	1597	3463	1879	1597	647	3570	1597	1026	3517	
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)	39	53	79	408	117	279	240	286	498	323	574	63
RTOR Reduction (vph)	0	0	72	0	0	188	0	0	326	0	7	0
Lane Group Flow (vph)	39	53	7	408	117	91	240	286	172	323	630	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4		4			8	2		2	6		
Actuated Green, G (s)	9.1	9.1	9.1	16.8	32.4	32.4	46.0	34.1	34.1	49.8	36.0	
Effective Green, g (s)	9.1	9.1	9.1	16.8	32.4	32.4	46.0	34.1	34.1	49.8	36.0	
Actuated g/C Ratio	0.09	0.09	0.09	0.17	0.33	0.33	0.47	0.35	0.35	0.50	0.36	
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	5.0	7.0	7.0	5.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	117	173	147	588	616	523	438	1232	551	623	1281	
v/s Ratio Prot		0.03		c0.12	0.06		0.07	0.08		c0.07	0.18	
v/s Ratio Perm	c0.03		0.00			0.06	c0.19		0.11	0.19		
v/c Ratio	0.33	0.31	0.05	0.69	0.19	0.17	0.55	0.23	0.31	0.52	0.49	
Uniform Delay, d1	42.0	41.9	40.9	38.6	23.8	23.7	16.5	23.0	23.7	14.9	24.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.7	1.0	0.1	3.5	0.2	0.2	1.4	0.4	1.5	0.7	1.4	
Delay (s)	43.7	42.9	41.0	42.1	23.9	23.8	17.9	23.5	25.2	15.6	25.7	
Level of Service	D	D	D	D	C	C	B	C	C	B	C	
Approach Delay (s)		42.2			33.1			23.0			22.3	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	98.8	Sum of lost time (s)	25.0
Intersection Capacity Utilization	70.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

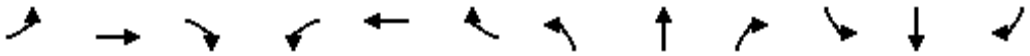
APPENDIX

C-2 *NO EXTENSION ALTERNATIVE*

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	3	317	222	32	230	3	259	13	40	7	17	20
Future Volume (vph)	3	317	222	32	230	3	259	13	40	7	17	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	1.00		1.00	0.89		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	3102		1552	3494		1517	1532		1785	1619	
Flt Permitted	0.60	1.00		0.37	1.00		0.73	1.00		0.72	1.00	
Satd. Flow (perm)	1118	3102		599	3494		1168	1532		1352	1619	
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)	3	345	241	35	250	3	282	14	43	8	18	22
RTOR Reduction (vph)	0	91	0	0	1	0	0	30	0	0	16	0
Lane Group Flow (vph)	3	495	0	35	252	0	282	27	0	8	24	0
Confl. Peds. (#/hr)							6					6
Heavy Vehicles (%)	0%	8%	8%	15%	2%	0%	17%	8%	9%	0%	6%	5%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	39.1	37.8		44.9	40.7		24.3	24.3		24.3	24.3	
Effective Green, g (s)	39.1	37.8		44.9	40.7		24.3	24.3		24.3	24.3	
Actuated g/C Ratio	0.48	0.46		0.55	0.49		0.30	0.30		0.30	0.30	
Clearance Time (s)	4.0	6.0		4.0	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)	541	1424		375	1727		344	452		399	478	
v/s Ratio Prot	0.00	c0.16		c0.00	0.07			0.02			0.02	
v/s Ratio Perm	0.00			0.05			c0.24			0.01		
v/c Ratio	0.01	0.35		0.09	0.15		0.82	0.06		0.02	0.05	
Uniform Delay, d1	11.4	14.3		8.9	11.3		27.0	20.8		20.6	20.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.7		0.1	0.2		14.1	0.1		0.0	0.0	
Delay (s)	11.4	15.0		9.0	11.5		41.1	20.9		20.6	20.8	
Level of Service	B	B		A	B		D	C		C	C	
Approach Delay (s)		15.0			11.2			37.7			20.8	
Approach LOS		B			B			D			C	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	82.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	11	226	321	44	54	2	158	187	18	2	492	19
Future Volume (vph)	11	226	321	44	54	2	158	187	18	2	492	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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	1.00		1.00	1.00		1.00	0.95		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	1.00		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1638	1595		1699	1675		1733	3408		1785	1847	
Flt Permitted	0.72	1.00		0.18	1.00		0.29	1.00		0.61	1.00	
Satd. Flow (perm)	1236	1595		327	1675		531	3408		1151	1847	
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)	12	246	349	48	59	2	172	203	20	2	535	21
RTOR Reduction (vph)	0	59	0	0	1	0	0	6	0	0	1	0
Lane Group Flow (vph)	12	536	0	48	60	0	172	217	0	2	555	0
Confl. Peds. (#/hr)			1	1								
Heavy Vehicles (%)	9%	6%	7%	5%	12%	0%	3%	2%	17%	0%	1%	5%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	34.3	34.3		34.3	34.3		40.7	40.7		40.7	40.7	
Effective Green, g (s)	34.3	34.3		34.3	34.3		40.7	40.7		40.7	40.7	
Actuated g/C Ratio	0.39	0.39		0.39	0.39		0.47	0.47		0.47	0.47	
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)	487	628		128	660		248	1594		538	864	
v/s Ratio Prot		c0.34			0.04			0.06			0.30	
v/s Ratio Perm	0.01			0.15			c0.32			0.00		
v/c Ratio	0.02	0.85		0.38	0.09		0.69	0.14		0.00	0.64	
Uniform Delay, d1	16.1	24.0		18.7	16.6		18.2	13.2		12.3	17.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	10.9		1.8	0.1		14.8	0.2		0.0	3.7	
Delay (s)	16.1	34.9		20.6	16.6		33.1	13.3		12.4	21.3	
Level of Service	B	C		C	B		C	B		B	C	
Approach Delay (s)		34.5			18.4			21.9			21.2	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	26.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	87.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	91.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

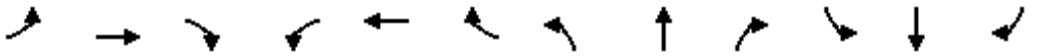
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	249	66	198	174	94	271
Future Volume (vph)	249	66	198	174	94	271
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	271	72	215	189	102	295

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	271	72	215	189	102	295
Volume Left (vph)	271	0	0	0	102	0
Volume Right (vph)	0	72	0	189	0	0
Hadj (s)	0.74	-0.55	0.41	-0.50	0.52	0.15
Departure Headway (s)	7.3	6.1	6.8	5.9	6.9	6.5
Degree Utilization, x	0.55	0.12	0.40	0.31	0.19	0.53
Capacity (veh/h)	470	558	513	587	501	538
Control Delay (s)	17.9	8.7	13.1	10.2	10.3	15.5
Approach Delay (s)	15.9		11.8		14.1	
Approach LOS	C		B		B	

Intersection Summary			
Delay	13.8		
Level of Service	B		
Intersection Capacity Utilization	39.4%	ICU Level of Service	A
Analysis Period (min)	15		

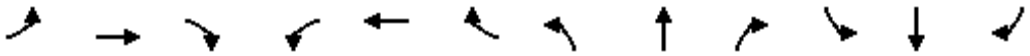
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	0	620	61	9	32	411	296	106	63	754	83
Future Volume (vph)	45	0	620	61	9	32	411	296	106	63	754	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5		6.5	6.5	6.5	6.5	5.0	7.0	7.0	7.0	7.0	
Lane Util. Factor	1.00		1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00		0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95		1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1566		1493	3395	1842	1566	1733	3216	1566	1750	3401	
Flt Permitted	0.75		1.00	0.95	1.00	1.00	0.12	1.00	1.00	0.56	1.00	
Satd. Flow (perm)	1238		1493	3395	1842	1566	216	3216	1566	1026	3401	
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)	49	0	674	66	10	35	447	322	115	68	820	90
RTOR Reduction (vph)	0	0	377	0	0	22	0	0	56	0	7	0
Lane Group Flow (vph)	49	0	297	66	10	13	447	322	59	68	903	0
Heavy Vehicles (%)	14%	2%	7%	2%	2%	2%	3%	11%	2%	2%	3%	7%
Turn Type	Perm		Perm	Prot	NA	Perm	pm+pt	NA	Perm	Perm	NA	
Protected Phases		4		3	8		5	2			6	
Permitted Phases	4		4			8	2		2	6		
Actuated Green, G (s)	22.4		22.4	9.2	38.1	38.1	55.0	55.0	55.0	28.8	28.8	
Effective Green, g (s)	22.4		22.4	9.2	38.1	38.1	55.0	55.0	55.0	28.8	28.8	
Actuated g/C Ratio	0.21		0.21	0.09	0.36	0.36	0.52	0.52	0.52	0.27	0.27	
Clearance Time (s)	6.5		6.5	6.5	6.5	6.5	5.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	260		313	293	658	559	413	1659	807	277	918	
v/s Ratio Prot				c0.02	0.01		c0.22	0.10			0.27	
v/s Ratio Perm	0.04		c0.20			0.01	c0.34		0.04	0.07		
v/c Ratio	0.19		0.95	0.23	0.02	0.02	1.08	0.19	0.07	0.25	0.98	
Uniform Delay, d1	34.6		41.5	45.4	22.1	22.2	31.8	13.9	13.0	30.4	38.7	
Progression Factor	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4		37.1	0.4	0.0	0.0	68.2	0.3	0.2	2.1	25.9	
Delay (s)	35.0		78.7	45.8	22.1	22.2	99.9	14.1	13.2	32.5	64.6	
Level of Service	C		E	D	C	C	F	B	B	C	E	
Approach Delay (s)		75.7			36.2			57.4			62.4	
Approach LOS		E			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	63.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	106.6	Sum of lost time (s)	25.0
Intersection Capacity Utilization	81.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	21	332	199	26	344	14	214	13	26	6	11	19
Future Volume (vph)	21	332	199	26	344	14	214	13	26	6	11	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.99		1.00	0.90		1.00	0.90	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	3369		1785	3549		1785	1691		1785	1700	
Flt Permitted	0.52	1.00		0.42	1.00		0.74	1.00		0.73	1.00	
Satd. Flow (perm)	981	3369		786	3549		1382	1691		1371	1700	
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)	23	361	216	28	374	15	233	14	28	7	12	21
RTOR Reduction (vph)	0	59	0	0	2	0	0	21	0	0	16	0
Lane Group Flow (vph)	23	518	0	28	387	0	233	21	0	7	17	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	44.6	41.9		44.6	41.9		18.7	18.7		18.7	18.7	
Effective Green, g (s)	44.6	41.9		44.6	41.9		18.7	18.7		18.7	18.7	
Actuated g/C Ratio	0.56	0.53		0.56	0.53		0.24	0.24		0.24	0.24	
Clearance Time (s)	4.0	6.0		4.0	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)	579	1780		476	1875		325	398		323	400	
v/s Ratio Prot	0.00	c0.15		c0.00	0.11			0.01			0.01	
v/s Ratio Perm	0.02			0.03			c0.17			0.01		
v/c Ratio	0.04	0.29		0.06	0.21		0.72	0.05		0.02	0.04	
Uniform Delay, d1	7.7	10.4		7.7	9.9		27.9	23.4		23.3	23.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.4		0.1	0.2		7.3	0.1		0.0	0.0	
Delay (s)	7.7	10.8		7.8	10.1		35.2	23.5		23.3	23.4	
Level of Service	A	B		A	B		D	C		C	C	
Approach Delay (s)		10.7			10.0			33.4			23.4	
Approach LOS		B			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	15.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	79.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	50.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



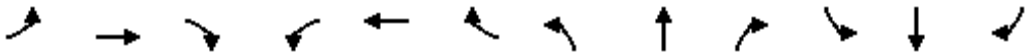
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	27	40	264	22	47	5	314	618	23	1	472	18
Future Volume (vph)	27	40	264	22	47	5	314	618	23	1	472	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	1.00	
Frt	1.00	0.87		1.00	0.99		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	1634		1638	1854		1785	3539		1785	1868	
Flt Permitted	0.72	1.00		0.31	1.00		0.27	1.00		0.39	1.00	
Satd. Flow (perm)	1354	1634		530	1854		515	3539		726	1868	
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)	29	43	287	24	51	5	341	672	25	1	513	20
RTOR Reduction (vph)	0	242	0	0	4	0	0	2	0	0	1	0
Lane Group Flow (vph)	29	88	0	24	52	0	341	695	0	1	532	0
Heavy Vehicles (%)	0%	0%	0%	9%	0%	0%	0%	0%	9%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	13.0	13.0		13.0	13.0		58.0	58.0		39.0	39.0	
Effective Green, g (s)	13.0	13.0		13.0	13.0		58.0	58.0		39.0	39.0	
Actuated g/C Ratio	0.16	0.16		0.16	0.16		0.70	0.70		0.47	0.47	
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)	212	255		83	290		558	2473		341	877	
v/s Ratio Prot		c0.05			0.03		c0.10	0.20			0.28	
v/s Ratio Perm	0.02			0.05			c0.33			0.00		
v/c Ratio	0.14	0.34		0.29	0.18		0.61	0.28		0.00	0.61	
Uniform Delay, d1	30.2	31.2		30.9	30.4		8.0	4.7		11.7	16.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.8		1.9	0.3		2.0	0.3		0.0	3.1	
Delay (s)	30.5	32.0		32.8	30.7		10.0	5.0		11.7	19.4	
Level of Service	C	C		C	C		B	A		B	B	
Approach Delay (s)		31.9			31.3			6.6			19.4	
Approach LOS		C			C			A			B	

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	83.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	117	172	134	128	115	144
Future Volume (vph)	117	172	134	128	115	144
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	127	187	146	139	125	157

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	127	187	146	139	125	157
Volume Left (vph)	127	0	0	0	125	0
Volume Right (vph)	0	187	0	139	0	0
Hadj (s)	0.55	-0.70	0.00	-0.67	0.50	0.00
Departure Headway (s)	6.5	5.2	5.8	5.1	6.2	5.7
Degree Utilization, x	0.23	0.27	0.23	0.20	0.22	0.25
Capacity (veh/h)	527	650	597	671	550	600
Control Delay (s)	10.2	8.9	9.3	8.1	9.8	9.4
Approach Delay (s)	9.4		8.7		9.6	
Approach LOS	A		A		A	

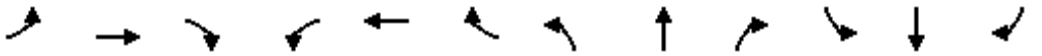
Intersection Summary			
Delay	9.3		
Level of Service	A		
Intersection Capacity Utilization	30.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	34	37	401	335	34	205	618	747	300	194	572	39
Future Volume (vph)	34	37	401	335	34	205	618	747	300	194	572	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	4.0	4.0	4.0	5.0	7.0	7.0	4.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1608	1879	1573	3463	1879	1597	1750	3570	1597	1785	3536	
Flt Permitted	0.73	1.00	1.00	0.95	1.00	1.00	0.17	1.00	1.00	0.32	1.00	
Satd. Flow (perm)	1241	1879	1573	3463	1879	1597	312	3570	1597	603	3536	
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)	37	40	436	364	37	223	672	812	326	211	622	42
RTOR Reduction (vph)	0	0	265	0	0	164	0	0	209	0	5	0
Lane Group Flow (vph)	37	40	171	364	37	59	672	812	117	211	659	0
Confl. Peds. (#/hr)			3									
Heavy Vehicles (%)	11%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4			8	2		2	6		
Actuated Green, G (s)	26.2	19.3	19.3	13.4	25.8	25.8	46.7	33.7	33.7	31.6	22.6	
Effective Green, g (s)	26.2	19.3	19.3	13.4	25.8	25.8	46.7	33.7	33.7	31.6	22.6	
Actuated g/C Ratio	0.27	0.20	0.20	0.14	0.27	0.27	0.48	0.35	0.35	0.33	0.23	
Clearance Time (s)	6.5	6.5	6.5	4.0	4.0	4.0	5.0	7.0	7.0	4.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	361	374	313	478	500	425	433	1241	555	306	824	
v/s Ratio Prot	0.01	0.02		c0.11	0.02		c0.31	0.23		0.06	0.19	
v/s Ratio Perm	0.02		c0.11			c0.04	c0.44		0.07	0.16		
v/c Ratio	0.10	0.11	0.55	0.76	0.07	0.14	1.55	0.65	0.21	0.69	0.80	
Uniform Delay, d1	26.4	31.7	34.9	40.2	26.6	27.1	25.4	26.7	22.2	25.0	35.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.1	1.9	7.0	0.1	0.2	259.6	2.7	0.9	6.3	8.0	
Delay (s)	26.5	31.9	36.8	47.3	26.7	27.2	285.0	29.4	23.1	31.3	43.1	
Level of Service	C	C	D	D	C	C	F	C	C	C	D	
Approach Delay (s)		35.7			38.9			123.2			40.2	
Approach LOS		D			D			F			D	

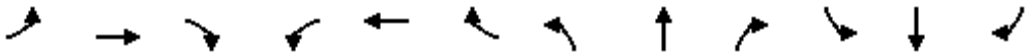
Intersection Summary			
HCM 2000 Control Delay	78.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	96.9	Sum of lost time (s)	22.5
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	382	65	19	289	6	183	2	25	6	3	12
Future Volume (vph)	4	382	65	19	289	6	183	2	25	6	3	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	6.0		4.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	1.00		1.00	0.86		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	3481		1785	3558		1741	1616		1785	1627	
Flt Permitted	0.56	1.00		0.46	1.00		0.75	1.00		0.74	1.00	
Satd. Flow (perm)	1047	3481		863	3558		1369	1616		1387	1627	
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)	4	415	71	21	314	7	199	2	27	7	3	13
RTOR Reduction (vph)	0	9	0	0	1	0	0	21	0	0	10	0
Lane Group Flow (vph)	4	477	0	21	320	0	199	8	0	7	6	0
Confl. Peds. (#/hr)							6					6
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	1	6		5	2			4			8	
Permitted Phases	6			2			4			8		
Actuated Green, G (s)	45.4	44.1		48.4	45.6		16.6	16.6		16.6	16.6	
Effective Green, g (s)	45.4	44.1		48.4	45.6		16.6	16.6		16.6	16.6	
Actuated g/C Ratio	0.57	0.55		0.61	0.57		0.21	0.21		0.21	0.21	
Clearance Time (s)	4.0	6.0		4.0	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)	609	1930		557	2040		285	337		289	339	
v/s Ratio Prot	0.00	c0.14		c0.00	0.09			0.00			0.00	
v/s Ratio Perm	0.00			0.02			c0.15			0.01		
v/c Ratio	0.01	0.25		0.04	0.16		0.70	0.02		0.02	0.02	
Uniform Delay, d1	7.3	9.1		6.2	7.9		29.1	25.0		25.0	25.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.3		0.0	0.2		7.3	0.0		0.0	0.0	
Delay (s)	7.3	9.4		6.2	8.1		36.4	25.0		25.0	25.0	
Level of Service	A	A		A	A		D	C		C	C	
Approach Delay (s)		9.4			8.0			35.0			25.0	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	14.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	79.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	42.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



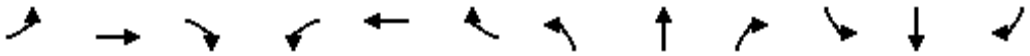
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	35	330	10	34	4	232	466	8	1	603	24
Future Volume (vph)	20	35	330	10	34	4	232	466	8	1	603	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	1.00	
Frt	1.00	0.86		1.00	0.99		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1785	1624		1785	1851		1785	3561		1785	1868	
Flt Permitted	0.73	1.00		0.27	1.00		0.24	1.00		0.46	1.00	
Satd. Flow (perm)	1372	1624		511	1851		447	3561		867	1868	
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)	22	38	359	11	37	4	252	507	9	1	655	26
RTOR Reduction (vph)	0	284	0	0	3	0	0	1	0	0	1	0
Lane Group Flow (vph)	22	113	0	11	38	0	252	515	0	1	680	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA		Perm	NA		pm+pt	NA		Perm	NA	
Protected Phases		4			8		5	2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	14.7	14.7		14.7	14.7		71.1	71.1		55.8	55.8	
Effective Green, g (s)	14.7	14.7		14.7	14.7		71.1	71.1		55.8	55.8	
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.73	0.73		0.57	0.57	
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)	206	244		76	278		452	2588		494	1065	
v/s Ratio Prot		c0.07			0.02		c0.05	0.14			c0.36	
v/s Ratio Perm	0.02			0.02			0.35			0.00		
v/c Ratio	0.11	0.46		0.14	0.14		0.56	0.20		0.00	0.64	
Uniform Delay, d1	35.9	38.0		36.1	36.0		9.2	4.3		9.0	14.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	1.4		0.9	0.2		1.5	0.2		0.0	2.9	
Delay (s)	36.1	39.3		37.0	36.3		10.7	4.4		9.0	17.1	
Level of Service	D	D		D	D		B	A		A	B	
Approach Delay (s)		39.2			36.4			6.5			17.1	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM 2000 Control Delay	18.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	97.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Traffic Volume (vph)	48	129	91	65	88	94
Future Volume (vph)	48	129	91	65	88	94
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	52	140	99	71	96	102

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	52	140	99	71	96	102
Volume Left (vph)	52	0	0	0	96	0
Volume Right (vph)	0	140	0	71	0	0
Hadj (s)	0.50	-0.67	0.00	-0.70	0.50	0.03
Departure Headway (s)	5.9	4.7	5.2	4.5	5.7	5.2
Degree Utilization, x	0.08	0.18	0.14	0.09	0.15	0.15
Capacity (veh/h)	576	718	662	760	609	664
Control Delay (s)	8.2	7.6	7.9	6.7	8.5	7.9
Approach Delay (s)	7.7		7.4		8.2	
Approach LOS	A		A		A	

Intersection Summary			
Delay	7.8		
Level of Service	A		
Intersection Capacity Utilization	22.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	37	336	435	48	257	475	422	470	297	715	31
Future Volume (vph)	36	37	336	435	48	257	475	422	470	297	715	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	6.5	6.5	6.5	6.5	6.5	5.0	7.0	7.0	5.0	7.0	
Lane Util. Factor	1.00	1.00	1.00	0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1785	1879	1597	3463	1879	1597	1785	3570	1597	1785	3547	
Flt Permitted	0.72	1.00	1.00	0.95	1.00	1.00	0.13	1.00	1.00	0.49	1.00	
Satd. Flow (perm)	1359	1879	1597	3463	1879	1597	239	3570	1597	916	3547	
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)	39	40	365	473	52	279	516	459	511	323	777	34
RTOR Reduction (vph)	0	0	322	0	0	187	0	0	328	0	3	0
Lane Group Flow (vph)	39	40	43	473	52	92	516	459	183	323	808	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Perm	NA	Perm	Prot	NA	Perm	pm+pt	NA	Perm	pm+pt	NA	
Protected Phases		4		3	8		5	2		1	6	
Permitted Phases	4		4			8	2		2	6		
Actuated Green, G (s)	12.6	12.6	12.6	16.3	35.4	35.4	58.4	38.5	38.5	41.3	26.4	
Effective Green, g (s)	12.6	12.6	12.6	16.3	35.4	35.4	58.4	38.5	38.5	41.3	26.4	
Actuated g/C Ratio	0.12	0.12	0.12	0.15	0.33	0.33	0.54	0.36	0.36	0.38	0.25	
Clearance Time (s)	6.5	6.5	6.5	6.5	6.5	6.5	5.0	7.0	7.0	5.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	159	220	187	526	619	526	519	1280	573	473	872	
v/s Ratio Prot		0.02		c0.14	0.03		c0.25	0.13		0.09	0.23	
v/s Ratio Perm	c0.03		0.03			0.06	c0.29		0.11	0.17		
v/c Ratio	0.25	0.18	0.23	0.90	0.08	0.17	0.99	0.36	0.32	0.68	0.93	
Uniform Delay, d1	43.0	42.7	42.9	44.7	24.8	25.6	31.0	25.3	24.9	24.8	39.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.8	0.4	0.6	18.0	0.1	0.2	37.8	0.8	1.5	4.0	17.2	
Delay (s)	43.8	43.1	43.6	62.7	24.8	25.7	68.8	26.1	26.4	28.8	56.7	
Level of Service	D	D	D	E	C	C	E	C	C	C	E	
Approach Delay (s)		43.6			47.4			41.0			48.7	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	44.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	107.3	Sum of lost time (s)	25.0
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX

D ROUNDABOUT ANALYSIS REPORTS

APPENDIX

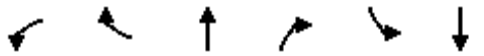
D-1 *SIGNALIZED INTERSECTION ALTERNATIVE*

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	90	133	130	80	252	317
Future Volume (vph)	90	133	130	80	252	317
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.95		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1785	1597	1782		1785	1879
Flt Permitted	0.95	1.00	1.00		0.62	1.00
Satd. Flow (perm)	1785	1597	1782		1158	1879
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	98	145	141	87	274	345
RTOR Reduction (vph)	0	127	17	0	0	0
Lane Group Flow (vph)	98	18	211	0	274	345
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	9.8	9.8	57.5		57.5	57.5
Effective Green, g (s)	9.8	9.8	57.5		57.5	57.5
Actuated g/C Ratio	0.12	0.12	0.73		0.73	0.73
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	220	197	1292		839	1362
v/s Ratio Prot	c0.05		0.12			0.18
v/s Ratio Perm		0.01			c0.24	
v/c Ratio	0.45	0.09	0.16		0.33	0.25
Uniform Delay, d1	32.2	30.8	3.4		3.9	3.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.4	0.2	0.3		1.0	0.4
Delay (s)	33.7	31.0	3.7		5.0	4.1
Level of Service	C	C	A		A	A
Approach Delay (s)	32.1		3.7			4.5
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	79.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.5%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

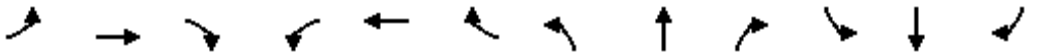
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	280	91	265	119	2	178	2	228	0	1	0
Future Volume (vph)	0	280	91	265	119	2	178	2	228	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0			6.0	6.0		6.0	
Lane Util. Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frpb, ped/bikes		1.00	0.99	1.00	1.00			1.00	0.99		1.00	
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Frt		1.00	0.85	1.00	1.00			1.00	0.85		1.00	
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00		1.00	
Satd. Flow (prot)		1879	1560	1784	1860			1790	1548		1879	
Flt Permitted		1.00	1.00	0.51	1.00			0.73	1.00		1.00	
Satd. Flow (perm)		1879	1560	960	1860			1369	1548		1879	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	304	99	288	129	2	193	2	248	0	1	0
RTOR Reduction (vph)	0	0	63	0	1	0	0	0	134	0	0	0
Lane Group Flow (vph)	0	304	36	288	130	0	0	195	114	0	1	0
Confl. Peds. (#/hr)			1	1					1	1		
Heavy Vehicles (%)	0%	0%	1%	0%	0%	50%	0%	0%	1%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	0
Turn Type		NA	Perm	Perm	NA		Perm	NA	Perm		NA	
Protected Phases		4			8			2			6	
Permitted Phases			4	8			2		2	6		
Actuated Green, G (s)		23.8	23.8	23.8	23.8			30.5	30.5		30.5	
Effective Green, g (s)		23.8	23.8	23.8	23.8			30.5	30.5		30.5	
Actuated g/C Ratio		0.36	0.36	0.36	0.36			0.46	0.46		0.46	
Clearance Time (s)		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	
Lane Grp Cap (vph)		674	560	344	667			629	712		864	
v/s Ratio Prot		0.16			0.07						0.00	
v/s Ratio Perm			0.02	c0.30				c0.14	0.07			
v/c Ratio		0.45	0.06	0.84	0.20			0.31	0.16		0.00	
Uniform Delay, d1		16.3	13.9	19.5	14.6			11.3	10.4		9.7	
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00		1.00	
Incremental Delay, d2		0.5	0.0	16.1	0.1			1.3	0.5		0.0	
Delay (s)		16.7	14.0	35.5	14.8			12.6	10.9		9.7	
Level of Service		B	B	D	B			B	B		A	
Approach Delay (s)		16.1			29.1			11.6			9.7	
Approach LOS		B			C			B			A	

Intersection Summary			
HCM 2000 Control Delay	18.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	66.3	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.1%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	40	310	200	80	193	239
Future Volume (vph)	40	310	200	80	193	239
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1785	1597	1806		1785	1879
Flt Permitted	0.95	1.00	1.00		0.57	1.00
Satd. Flow (perm)	1785	1597	1806		1080	1879
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	337	217	87	210	260
RTOR Reduction (vph)	0	294	10	0	0	0
Lane Group Flow (vph)	43	43	294	0	210	260
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	8.5	8.5	45.4		45.4	45.4
Effective Green, g (s)	8.5	8.5	45.4		45.4	45.4
Actuated g/C Ratio	0.13	0.13	0.69		0.69	0.69
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	230	205	1244		744	1294
v/s Ratio Prot	0.02		0.16			0.14
v/s Ratio Perm		c0.03			c0.19	
v/c Ratio	0.19	0.21	0.24		0.28	0.20
Uniform Delay, d1	25.6	25.7	3.8		4.0	3.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.4	0.5	0.4		0.9	0.3
Delay (s)	26.0	26.2	4.3		4.9	4.1
Level of Service	C	C	A		A	A
Approach Delay (s)	26.2		4.3			4.4
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	11.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	65.9	Sum of lost time (s)	12.0
Intersection Capacity Utilization	46.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	201	120	436	234	1	133	0	273	0	0	0
Future Volume (vph)	0	201	120	436	234	1	133	0	273	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0			6.0	6.0			
Lane Util. Factor		1.00	1.00	1.00	1.00			1.00	1.00			
Frpb, ped/bikes		1.00	0.99	1.00	1.00			1.00	0.99			
Flpb, ped/bikes		1.00	1.00	1.00	1.00			1.00	1.00			
Frt		1.00	0.85	1.00	1.00			1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (prot)		1879	1574	1782	1878			1785	1563			
Flt Permitted		1.00	1.00	0.62	1.00			0.76	1.00			
Satd. Flow (perm)		1879	1574	1166	1878			1423	1563			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	218	130	474	254	1	145	0	297	0	0	0
RTOR Reduction (vph)	0	0	66	0	0	0	0	0	200	0	0	0
Lane Group Flow (vph)	0	218	64	474	255	0	0	145	97	0	0	0
Confl. Peds. (#/hr)	3		2	2		3			1	1		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	0
Turn Type		NA	Perm	Perm	NA		Perm	NA	Perm			
Protected Phases		4			8			2			6	
Permitted Phases			4	8			2		2	6		
Actuated Green, G (s)		32.7	32.7	32.7	32.7			21.8	21.8			
Effective Green, g (s)		32.7	32.7	32.7	32.7			21.8	21.8			
Actuated g/C Ratio		0.49	0.49	0.49	0.49			0.33	0.33			
Clearance Time (s)		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			
Lane Grp Cap (vph)		923	773	573	923			466	512			
v/s Ratio Prot		0.12			0.14							
v/s Ratio Perm			0.04	c0.41				c0.10	0.06			
v/c Ratio		0.24	0.08	0.83	0.28			0.31	0.19			
Uniform Delay, d1		9.7	9.0	14.5	9.9			16.7	16.0			
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00			
Incremental Delay, d2		0.1	0.0	9.5	0.2			1.7	0.8			
Delay (s)		9.9	9.0	24.0	10.1			18.5	16.8			
Level of Service		A	A	C	B			B	B			
Approach Delay (s)		9.5			19.2			17.4			0.0	
Approach LOS		A			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	16.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	66.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	63.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	200	231	281	90	318	299
Future Volume (vph)	200	231	281	90	318	299
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	6.0		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1785	1597	1817		1785	1879
Flt Permitted	0.95	1.00	1.00		0.51	1.00
Satd. Flow (perm)	1785	1597	1817		957	1879
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	217	251	305	98	346	325
RTOR Reduction (vph)	0	207	12	0	0	0
Lane Group Flow (vph)	217	44	391	0	346	325
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%
Turn Type	Prot	Perm	NA		Perm	NA
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	15.0	15.0	59.1		59.1	59.1
Effective Green, g (s)	15.0	15.0	59.1		59.1	59.1
Actuated g/C Ratio	0.17	0.17	0.69		0.69	0.69
Clearance Time (s)	6.0	6.0	6.0		6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	310	278	1247		656	1289
v/s Ratio Prot	c0.12		0.22			0.17
v/s Ratio Perm		0.03			c0.36	
v/c Ratio	0.70	0.16	0.31		0.53	0.25
Uniform Delay, d1	33.4	30.2	5.4		6.6	5.1
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	6.8	0.3	0.7		3.0	0.5
Delay (s)	40.2	30.4	6.1		9.7	5.6
Level of Service	D	C	A		A	A
Approach Delay (s)	35.0		6.1			7.7
Approach LOS	C		A			A

Intersection Summary			
HCM 2000 Control Delay	15.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	86.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	306	208	347	385	0	170	0	330	0	0	0
Future Volume (vph)	0	306	208	347	385	0	170	0	330	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0	6.0	6.0	6.0			6.0	6.0			
Lane Util. Factor		1.00	1.00	1.00	1.00			1.00	1.00			
Frt		1.00	0.85	1.00	1.00			1.00	0.85			
Flt Protected		1.00	1.00	0.95	1.00			0.95	1.00			
Satd. Flow (prot)		1879	1597	1785	1879			1785	1569			
Flt Permitted		1.00	1.00	0.52	1.00			0.76	1.00			
Satd. Flow (perm)		1879	1597	980	1879			1423	1569			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	333	226	377	418	0	185	0	359	0	0	0
RTOR Reduction (vph)	0	0	121	0	0	0	0	0	231	0	0	0
Lane Group Flow (vph)	0	333	105	377	418	0	0	185	128	0	0	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	2	0	0	0
Turn Type		NA	Perm	Perm	NA		Perm	NA	Perm			
Protected Phases		4			8			2			6	
Permitted Phases			4	8			2		2	6		
Actuated Green, G (s)		31.2	31.2	31.2	31.2			23.8	23.8			
Effective Green, g (s)		31.2	31.2	31.2	31.2			23.8	23.8			
Actuated g/C Ratio		0.47	0.47	0.47	0.47			0.36	0.36			
Clearance Time (s)		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			
Lane Grp Cap (vph)		874	743	456	874			505	557			
v/s Ratio Prot		0.18			0.22							
v/s Ratio Perm			0.07	c0.38				c0.13	0.08			
v/c Ratio		0.38	0.14	0.83	0.48			0.37	0.23			
Uniform Delay, d1		11.6	10.2	15.6	12.3			16.0	15.2			
Progression Factor		1.00	1.00	1.00	1.00			1.00	1.00			
Incremental Delay, d2		0.3	0.1	11.7	0.4			2.0	1.0			
Delay (s)		11.9	10.3	27.2	12.7			18.1	16.1			
Level of Service		B	B	C	B			B	B			
Approach Delay (s)		11.3			19.6			16.8			0.0	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	67.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX

D-2 *ROUNDABOUT ALTERNATIVE*

LANE SUMMARY

Site: FT - Full Extension_AM

Quinn Dr. & Lamberton Mall Rd.
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lamberton Mall Road													
Lane 1	196	0.0	898	0.218	79[5]	6.2	LOS A	0.7	4.7	Full	70	0.0	0.0
Lane 2[d]	248	2.0	903	0.275	100	6.9	LOS A	0.8	6.0	Full	70	0.0	0.0
Approach	443	1.1		0.275		6.6	LOS A	0.8	6.0				
East: Quinn Drive													
Lane 1[d]	288	0.0	985	0.293	100	6.6	LOS A	0.9	6.6	Full	500	0.0	0.0
Lane 2	132	0.8	971	0.135	46[5]	5.0	LOS A	0.4	2.7	Full	500	0.0	0.0
Approach	420	0.3		0.293		6.1	LOS A	0.9	6.6				
North: Home Depot Access													
Lane 1[d]	3	0.0	737	0.004	100	4.9	LOS A	0.0	0.1	Full	150	0.0	0.0
Approach	3	0.0		0.004		4.9	LOS A	0.0	0.1				
West: Quinn Drive													
Lane 1	201	0.0	909	0.221	100	6.2	LOS A	0.7	4.8	Full	500	0.0	0.0
Lane 2[d]	203	0.5	920	0.221	100	6.1	LOS A	0.6	4.6	Full	500	0.0	0.0
Approach	404	0.2		0.221		6.2	LOS A	0.7	4.8				
Intersection	1271	0.6		0.293		6.3	LOS A	0.9	6.6				

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

LANE SUMMARY

Site: FT - PM - Full Extension_PM

Quinn Dr. & Lamberton Mall Road
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lamberton Mall Rd.													
Lane 1	146	0.0	958	0.152	49[5]	5.2	LOS A	0.4	3.1	Full	70	0.0	0.0
Lane 2[d]	297	2.0	959	0.310	100	7.0	LOS A	1.0	7.1	Full	70	0.0	0.0
Approach	442	1.3		0.310		6.4	LOS A	1.0	7.1				
East: Quinn Drive													
Lane 1[d]	474	0.0	1020	0.465	100	8.9	LOS A	1.9	13.4	Full	500	0.0	0.0
Lane 2	255	0.2	1011	0.253	54[5]	6.0	LOS A	0.8	5.8	Full	500	0.0	0.0
Approach	729	0.1		0.465		7.9	LOS A	1.9	13.4				
North: Home Depot Access													
Lane 1[d]	3	0.0	613	0.005	100	5.9	LOS A	0.0	0.1	Full	150	0.0	0.0
Approach	3	0.0		0.005		5.9	LOS A	0.0	0.1				
West: Quinn Drive													
Lane 1	173	0.0	791	0.219	100	6.9	LOS A	0.7	4.7	Full	500	0.0	0.0
Lane 2[d]	177	0.7	807	0.219	100	6.8	LOS A	0.6	4.4	Full	500	0.0	0.0
Approach	350	0.4		0.219		6.9	LOS A	0.7	4.7				
Intersection	1525	0.5		0.465		7.2	LOS A	1.9	13.4				

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

LANE SUMMARY

Site: FT - Full Extension_Saturday

Quinn Dr. & Lamberton Mall Road
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Lamberton Mall Rd.													
Lane 1	186	0.0	879	0.211	52[5]	6.2	LOS A	0.6	4.5	Full	70	0.0	0.0
Lane 2[d]	359	2.0	885	0.405	100	8.9	LOS A	1.4	10.1	Full	70	0.0	0.0
Approach	545	1.3		0.405		8.0	LOS A	1.4	10.1				
East: Quinn Drive													
Lane 1	397	0.0	982	0.404	100	8.2	LOS A	1.6	11.1	Full	500	0.0	0.0
Lane 2[d]	400	0.1	991	0.404	100	8.1	LOS A	1.5	10.5	Full	500	0.0	0.0
Approach	797	0.1		0.404		8.1	LOS A	1.6	11.1				
North: Home Depot Access													
Lane 1[d]	3	0.0	569	0.006	100	6.4	LOS A	0.0	0.1	Full	150	0.0	0.0
Approach	3	0.0		0.006		6.4	LOS A	0.0	0.1				
West: Quinn Drive													
Lane 1	278	0.0	850	0.327	100	7.9	LOS A	1.1	7.8	Full	500	0.0	0.0
Lane 2[d]	282	0.8	863	0.327	100	7.8	LOS A	1.0	7.4	Full	500	0.0	0.0
Approach	560	0.4		0.327		7.9	LOS A	1.1	7.8				
Intersection	1904	0.5		0.405		8.0	LOS A	1.6	11.1				

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

LANE SUMMARY

Site: FT - Full Extension_AM

Quinn Dr. & Repids Parkway
Roundabout

Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Rapids Parkway													
Lane 1[d]	228	2.0	848	0.269	100	7.1	LOS A	1.1	7.9	Full	70	0.0	0.0
Approach	228	2.0		0.269		7.1	LOS A	1.1	7.9				
East: Quinn Drive													
Lane 1[d]	242	2.0	970	0.250	100	6.2	LOS A	1.1	7.5	Full	500	0.0	0.0
Approach	242	2.0		0.250		6.2	LOS A	1.1	7.5				
North: Rapids Parkway													
Lane 1[d]	618	2.0	1014	0.610	100	12.1	LOS B	4.5	31.8	Full	150	0.0	0.0
Approach	618	2.0		0.610		12.1	LOS B	4.5	31.8				
Intersection	1089	2.0		0.610		9.7	LOS A	4.5	31.8				

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: FT - Full Extension_PM

Quinn Dr. & Repids Parkway
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Rapids Parkway													
Lane 1[d]	304	2.0	905	0.336	100	7.7	LOS A	1.5	10.8	Full	70	0.0	0.0
Approach	304	2.0		0.336		7.7	LOS A	1.5	10.8				
East: Quinn Drive													
Lane 1[d]	380	2.0	898	0.424	100	9.1	LOS A	2.1	14.9	Full	500	0.0	0.0
Approach	380	2.0		0.424		9.1	LOS A	2.1	14.9				
North: Rapids Parkway													
Lane 1[d]	470	2.0	1071	0.439	100	8.2	LOS A	2.5	17.8	Full	150	0.0	0.0
Approach	470	2.0		0.439		8.2	LOS A	2.5	17.8				
Intersection	1154	2.0		0.439		8.3	LOS A	2.5	17.8				

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

LANE SUMMARY

Site: FT - Full Extension_Saturday

Quinn Dr. & Repids Parkway
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Rapids Parkway													
Lane 1[d]	403	2.0	789	0.511	100	11.8	LOS B	2.9	20.5	Full	70	0.0	0.0
Approach	403	2.0		0.511		11.8	LOS B	2.9	20.5				
East: Quinn Drive													
Lane 1[d]	468	2.0	822	0.570	100	13.0	LOS B	3.7	26.0	Full	500	0.0	0.0
Approach	468	2.0		0.570		13.0	LOS B	3.7	26.0				
North: Rapids Parkway													
Lane 1[d]	671	2.0	898	0.747	100	19.0	LOS B	7.8	55.2	Full	150	0.0	0.0
Approach	671	2.0		0.747		19.0	LOS B	7.8	55.2				
Intersection	1542	2.0		0.747		15.3	LOS B	7.8	55.2				

Level of Service (LOS) Method: Delay (HCM 2000).
Roundabout LOS Method: Same as Signalised Intersections.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: US HCM 2010.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach